lesser slave lake provincial park

MASTER PLAN STUDY

LOMBARD NORTH PLANNING LTD.

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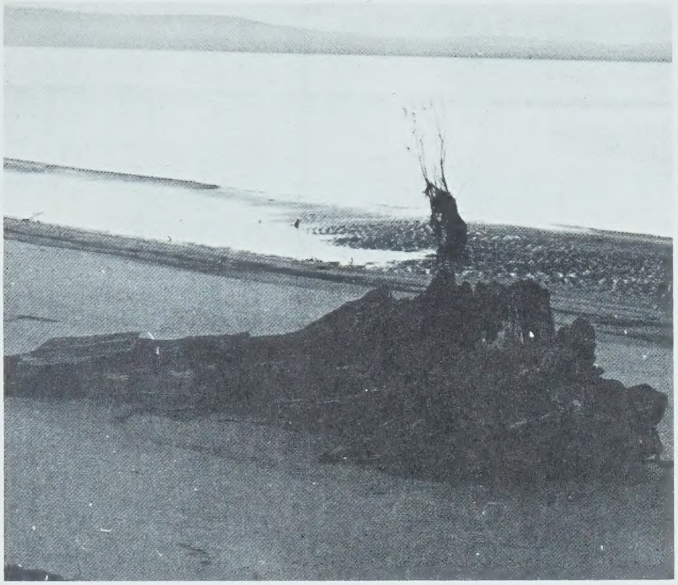
ACKNOWLEDGEMENTS

The Consultants wish to thank Mr. C.H. Harvie, Parks Planning Supervisor, Provincial Parks Branch, Alberta Department of Lands and Forests and the Planning Staff for their assistance in acquiring base materials, photo mosaics and site information.



lesser slave lake provincial park

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ABSTRACT

This report seeks to make planning recommendations for the restoration, development and expansion of Lesser Slave Lake Provincial Park based upon a thorough inventory of climatic, geologic, biotic, archaeologic and scenic resources. These resources, combined with consideration of existing land uses and developments, have been analyzed to determine the lands carrying capacity for recreation use, together with identification of areas of recreation demand and development constraints

The planning recommendations include proposed zoning, land use master plan, development standards and guidelines, proposed development sketches for selected day use and campground areas, general reclamation and management suggestions and comments concerning appropriate handling of non-park uses within the study area.

Prepared for the Planning Office, Provincial Parks Branch, Alberta Department of Lands and Forests

may 1972.

Lombard North Planning Ltd.

WINNIPEG
CALGARY
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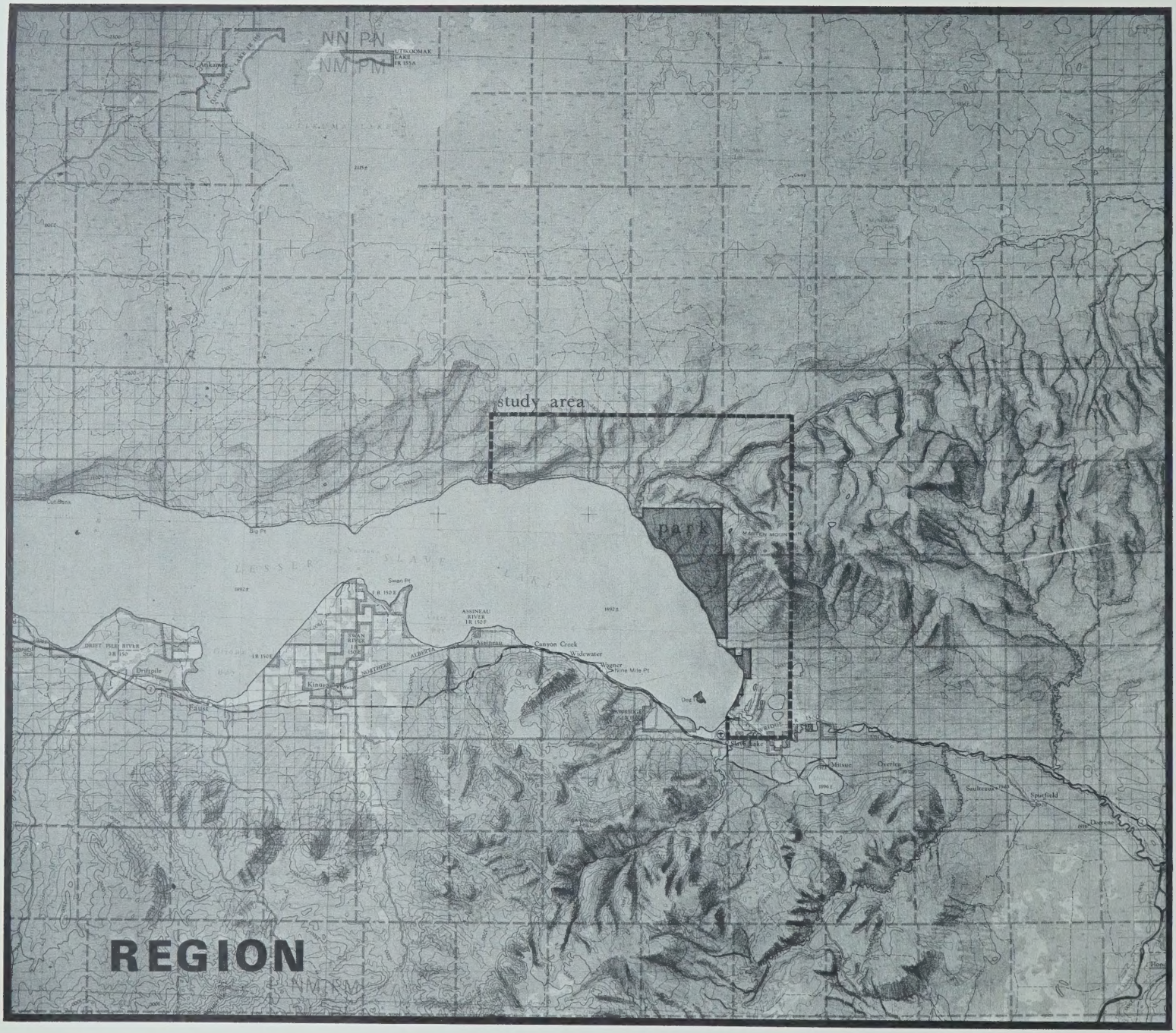
CONTENTS


study area
park
REGION
Ankarmi
UTIKOOMAK LAKE IR 85A
Big Pt
Swan Pt
IR 150E
ASSINEAU RIVER IR 150F
SWAN RIVER IR 150C
DRIFT PILE RIVER IR 150
Driftpile
Kinuso
Faust
ASSINEAU
Canyon Creek
Widewater
Wagner
Nine Mile Pt
Slave Lake
Mitsue
Overlea
Smith
Southvale
Spirfield
Doverne

I. INTRODUCTION

PURPOSE

1. It is the purpose of this study to inventory, analyse and describe consequential nature and cultural conditions of the study area and their key interrelationships and to recommend appropriate land use zones, recreational facilities and guidelines based upon these findings.

2. It is our goal to present this report in such a way that both the recommendations and their rationale are clearly understandable in order that it may be used as flexibly as possible.

3. In order to increase the usefulness of this report as a reference, a chart presenting important characteristics of the various land units surveyed has been placed in the Appendix.

STUDY AREA

The approximately 120,000 acres that comprise the Lesser Slave Lake study area are found within the boundaries 114°40'W longitude to 115°10'W longitude and 55°17'N latitude and 55°35 1/2'N latitude.

It is located at the eastern end of Lesser Slave Lake and includes Lesser Slave Lake Provincial Park and surrounding areas as shown on the accompanying map.

TIME OF STUDY

Because of time limitations, the work was carried out during the late fall and winter of 1971 and early months of 1972. Therefore, little opportunity was available for extensive field surveys.

METHODOLOGY

A. Inventory: The gathering, compilation and synthesis of pertinent data into forms from which an understanding of the study area can be recorded for evaluation. Where applicable, the study has included regional considerations as well as conditions within the study area.

1.) The following methods of Inventory have been used:
   a. Air-Photo interpretation
   b. Study of existing topography, forestry and other resource maps
   c. Field Study: including reconnaissance by air and land
   d. Interviews: Discussions with people familiar with the area or who may have helpful expertise in areas related to the study

2.) Areas of Study - Each of the following factors are inventoried and mapped.
   a. Natural forms
      1. Geology
      2. Soils
      3. Ground water
      4. Surface water - pattern, quality and edge
      5. Vegetation
      6. Wildlife - birds & mammals
      7. Fish
      8. Climate
      9. Topography - relative elevation and slope
      10. Visual resources & quality
   b. Cultural forms
      1. Prehistoric sites
      2. Historic sites
      3. Current Land Uses.

B. Analysis: The data gathered has been synthesized and evaluated to identify areas of resource sensitivity, ecological interrelationships, key development potential or conservancy areas and possible impact of future development on the study area. This material

forms the basis upon which planning decisions may be made.

C. Land Use Master Plan: Graphic studies illustrate the findings of prior work in terms of use to which the land is best suited. Circulation routes would be located as to visual impact, ease of construction and environmental compatibility. Park expansion recommendations have been made.

RECREATION DEMAND

While it is not within the terms of reference of this study to analyse recreation demand for the study area, a few points should be considered:

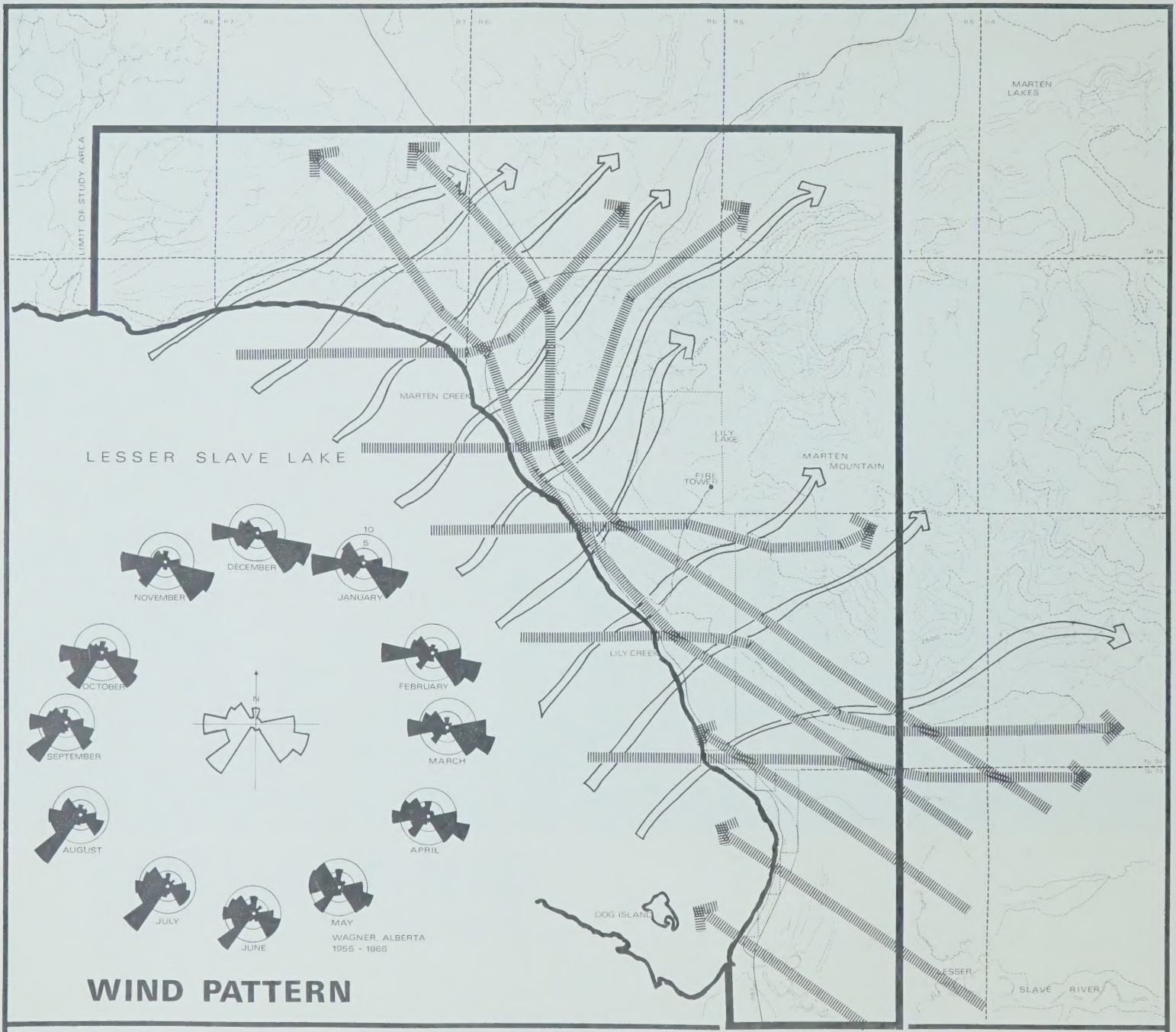
1. Mr. W.M. Baker, in his October 1971 report "Tourist & Recreation Patterns and Prospects For Lesser Slave Lake Special Area", indicates his belief that tourist demand from outside the immediate area will not be significant until 1981.

2. Statements by the Parks Branch and evidence at existing campgrounds indicates that whatever the level of existing demand, it far exceeds existing campground capacity.

3. Neither source offered quantitative recommendations in terms of either facility size, type or user demand.

Based upon these observations, this report will attempt to define the desirable extent of recreation development based upon long term land carrying capacity, accessibility, and suitability for visitor use.

II. INVENTORY



WIND PATTERN

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LESSER SLAVE LAKE PROVINCIAL PARK

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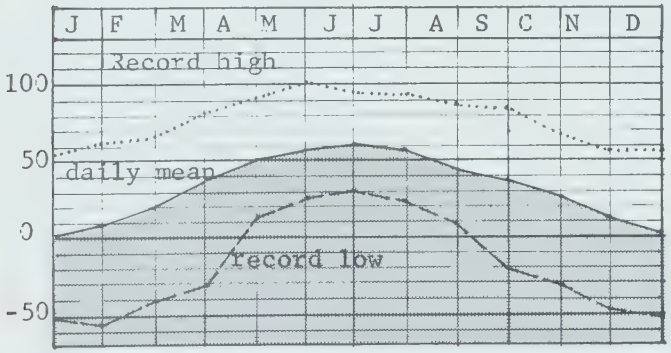
NORTH

0 1 MILE 5

II. INVENTORY

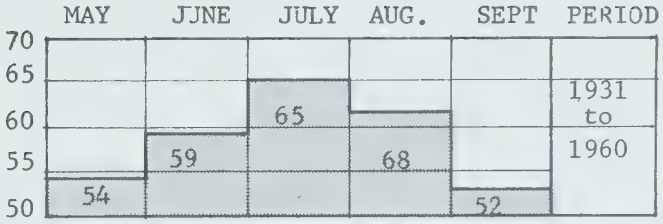
WEATHER

The climate of the Lesser Slave Lake area is typical of the Boreal Mixedwood Forest region. There is a slight lowering of temperature and modification of macro-climatic conditions due to the proximity of Lesser Slave Lake. From the data accumulated, this area is in the Koeppen Climatic Zone of short cool summers (Shantz, 1970). There are about 100 frost free days. Extreme temperatures vary from 100°F to -55°F, but these are rare. The mean daily maximum for August is just under 70°F while the mean daily minimum for January is about -8°F. Mean annual rainfall is 12.72 inches, with mean annual snowfall of 56 inches, giving a total mean precipitation of only 18.32 inches. The majority of this falls during the summer months with twelve, eleven & ten days of measurable precipitation respectively for the months of June, July and August



MEAN AND EXTREME TEMPERATURES

Prevailing winter winds are about equally divided between westerlies and winds from the Southeast; both are fairly constant. Summer winds strongly favor the southwest and blow across the lake before reaching the study area. In this climatic area such a cooling effect is welcome only during the warmest days and is less welcome during much of the tourist season.



PROBABLE 30-YR. MEAN MAX. TEMPERATURE

THE LAKE

Lesser Slave Lake has a moderate effect upon the local climate. Local residents report that severe winter weather is rarely encountered before freez-up which occurs from October 10 to 20th. Breakup comes between May 10 to 20th.

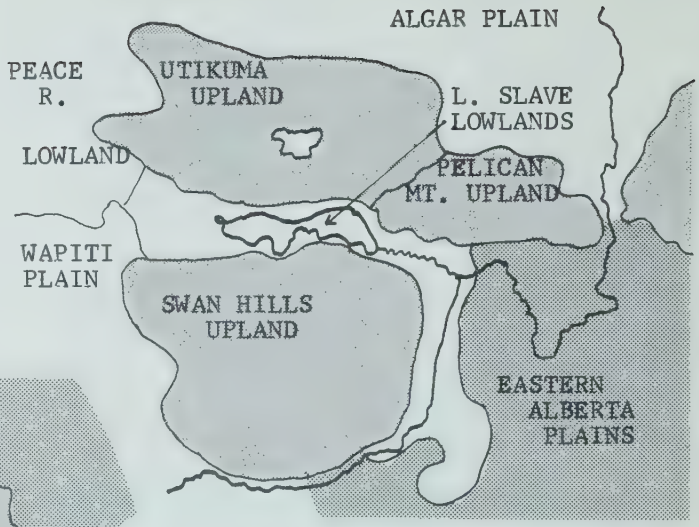
Water temperatures in Lesser Slave Lake vary greatly because of its extensive shallows, which warm quickly during warm weather. Typical summer water temperatures are warm enough for swimming.

Sudden squalls and sharp westerly winds quickly generate dangerously large waves (up to 10') in the shallow southeastern end of the lake and discouraging recreational boating. Commercial fishing is responsible for most of the present boating use. The R.C.M.P. report 5 deaths on the lake in the past 15 years. This figure would undoubtably increase if the lake became used extensively for pleasure craft.

GEOLOGY

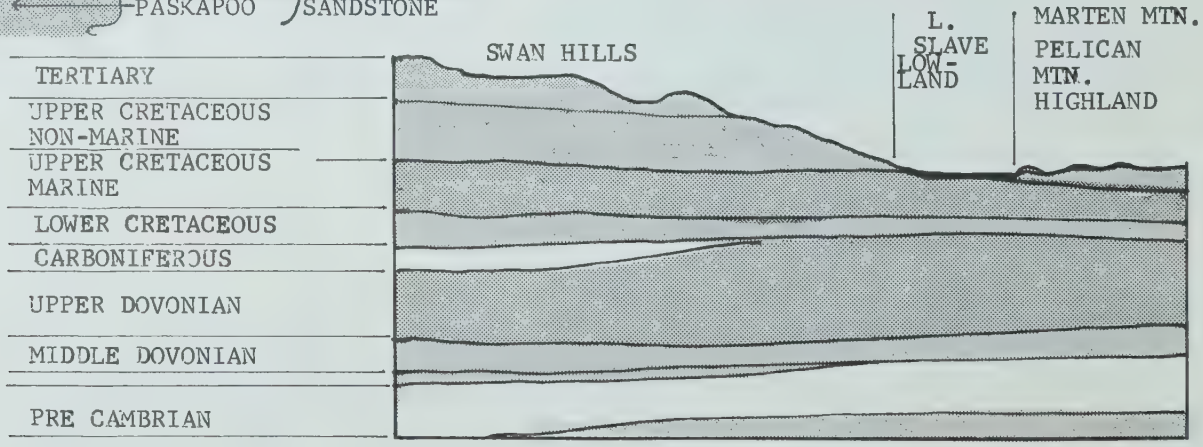
INTRODUCTION

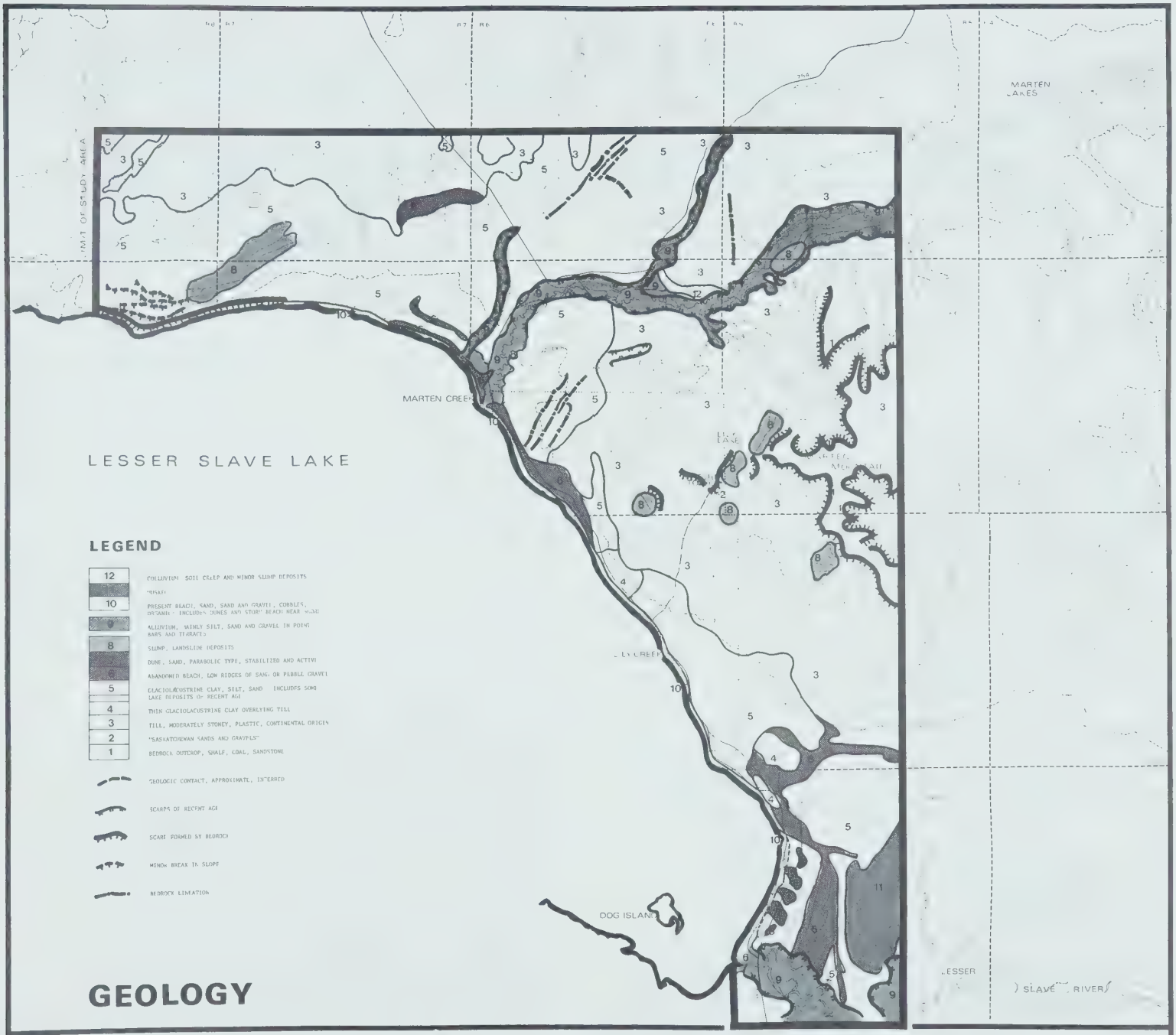
Lesser Slave Lake Park is situated within the Lesser Slave Lowland bordered on the north by the Pelican Mountain Upland and on the south by the Swan Hills Upland. Geologic materials which form these landforms consist of a variety of deposits which range in age from Upper Cretaceous to Recent.



MAJOR PHYSIOGRAPHIC ZONES

BEDROCK FORMATION





GEOLOGY

MASTER PLAN STUDY

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NORTH

0 1 MILE

BEDROCK DEPOSITS

Much of the bedrock in the area consists of nonmarine strata composed of varicolored poorly consolidated shale, sandstone and minor coal seams which belong to the Wapiti Formation of Upper Cretaceous age. Some outcrops of the Wapiti Formation can be found along existing road cuts at higher elevation or along scarps of Marten Mountain, but in most places this bedrock material is mantled with a younger layer of glacial or nonglacial sediment.

The oldest near-surface bedrock deposit is referred to as the Bearspaw Formation and is also of Upper Cretaceous age. This unit lies below the Wapiti Formation and is composed of gray shale of marine origin. The Bearspaw Formation occurs in the lowlands which flank Marten Mountain; several outcrops occur in borrow pits along the main road in the park.

SURFICIAL DEPOSITS

Surficial deposits mantle the entire area and consist of cobble gravel, deposited by streams prior to glaciation, till and lacustrine deposits of glacial origin and dune, beach, alluvial and muskeg deposits of nonglacial origin.

A. Preglacial Gravel - (Saskatchewan Sands and Gravels)

A thick layer of unconsolidated cobble gravel occurs as a capping on most of the uplands in the region. This gravel overlies the bedrock and underlies all other surficial material in the uplands. Commonly the gravel is 10 to 20 feet thick and is composed primarily of well rounded quartzite cobbles and boulders. The gravel is similar in origin and character to capping gravels of the Porcupine Hills, Hand Hills and Cypress Hills in other parts of Alberta. The gravel unit is generally believed to represent part of a river system which developed during the final stages of Rocky Mountain upheaval but long before the area was affected by glaciers.

B. Glacial Sediment

1. Till. Till is the most widespread surficial deposit in the upland region. It is a medium gray moderately stony, sandy clay, very plastic and averages about 10 feet thick. The geomorphic expression of the till is in the form of moraine which exhibits gentle local relief in the order of 5 to 10 feet. The till originated directly from the large scale melting of the great Continental glacier which was about 8000 feet thick and finally disappeared about 11,000 years ago.

2. Lacustrine Deposits. Lacustrine deposits from a former glacial lake occur extensively within the lowland up to an elevation of approximately 2000'. These deposits consist of raised beaches, buried deltas and a widespread blanket of silty clay. The raised beaches most commonly consist of cross-stratified sandy gravel which occurs in distinct subparallel ridges up to 10 feet high. These prominent abandoned beaches are mute testimony of prolonged storm activity in the glacial lake prior to complete disappearance of ice. Periodic drainage of the lake and subsequent rebound of the earth as the ice disappeared, resulted in the formation of a whole series of these raised beaches as the lake level dropped to its present elevation. The raised beaches provided one of the most important recreational geology resources within the park.

C. Nonglacial Sediments

Nonglacial sediments are of Recent Age and include alluvium in present stream valleys, lake sediments, storm beaches and other shoreline deposits of Lesser Slave Lake, aeolian deposits (active and stabilized dune sand), organic deposits and slump material.

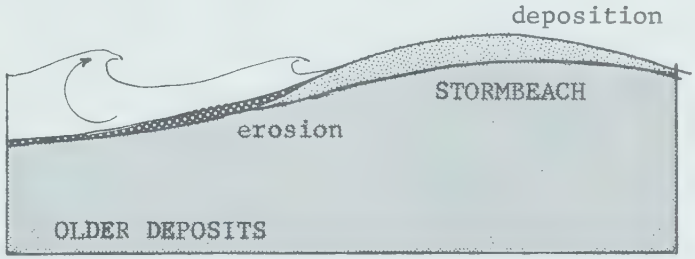
1. Alluvium and Lacustrine Sediments. Alluvial deposits include terraces and point bar deposits developed along the courses of Lesser Slave River, Marten Creek and other streams in the area.

2. Lake or Lacustrine Sediments. Clays, silts and sand are presently being deposited not only in Lesser Slave Lake but also in the marshes, ponds, oxbow lakes and other lakes in the area. Many of the smaller lakes are slowly being "silted" up which is a continuation of a general geologic trend established at the end of the Ice Age.

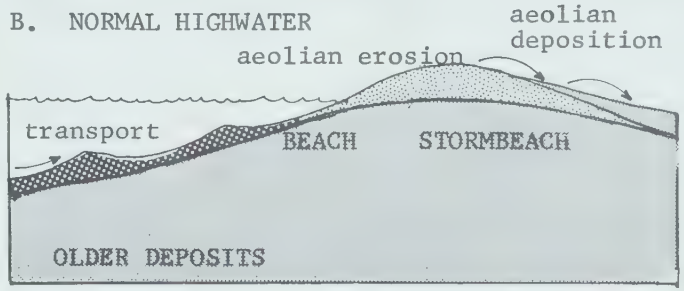
3. Beach Deposits and Dynamic Geologic Processes. The beach and nearshore deposits of Lesser Slave Lake within the park originated in response to a certain set of dynamic processes acting upon foreshore landforms of different compositions over a considerable period of time. Present beach materials and an interpretation of these dynamic processes of erosion and deposition are given opposite. Five general types of beach materials can be recognized - a data summary of each of the beach materials is given in Table 2.

4. Aeolian Deposits. Aeolian activity or wind action is an important process along the lake shore at the present time as it was in the geologic past judging from the occurrency of oil stabilized dunes. To gain an insight into the evolution of these features it is necessary to realize that most of the beach ridges were built during storms. Subsequent to a storm the material is exposed to wind action and if the particles are of a size amenable to wind transport then aeolian activity will occur. Thus most of the raised beaches, and especially the present day beach ridge, have been subjected to considerable modification by aeolian activity. Also, during periods of low water the sand on the beach is subject to landward transport by aeolian action and is thus continually built up against or on top of the storm beach.

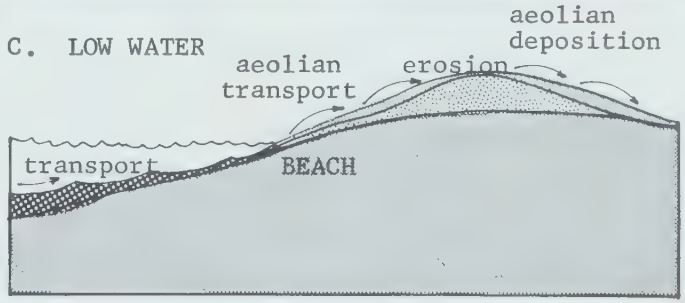
A. DURING STORM



B. NORMAL HIGHWATER



C. LOW WATER



Today aeolian activity, erosion and deposition, is occurring at vulnerable spots here and there along the shoreline as illustrated in the accompanying photo. This process would cease if the supply of sand was eliminated or if resistance to erosion was increased. Most of the highly active aeolian erosion areas are continuously supplied by littoral drift and offshore sediment supplies.

WIND AND WAVES BUILDING A BEACH

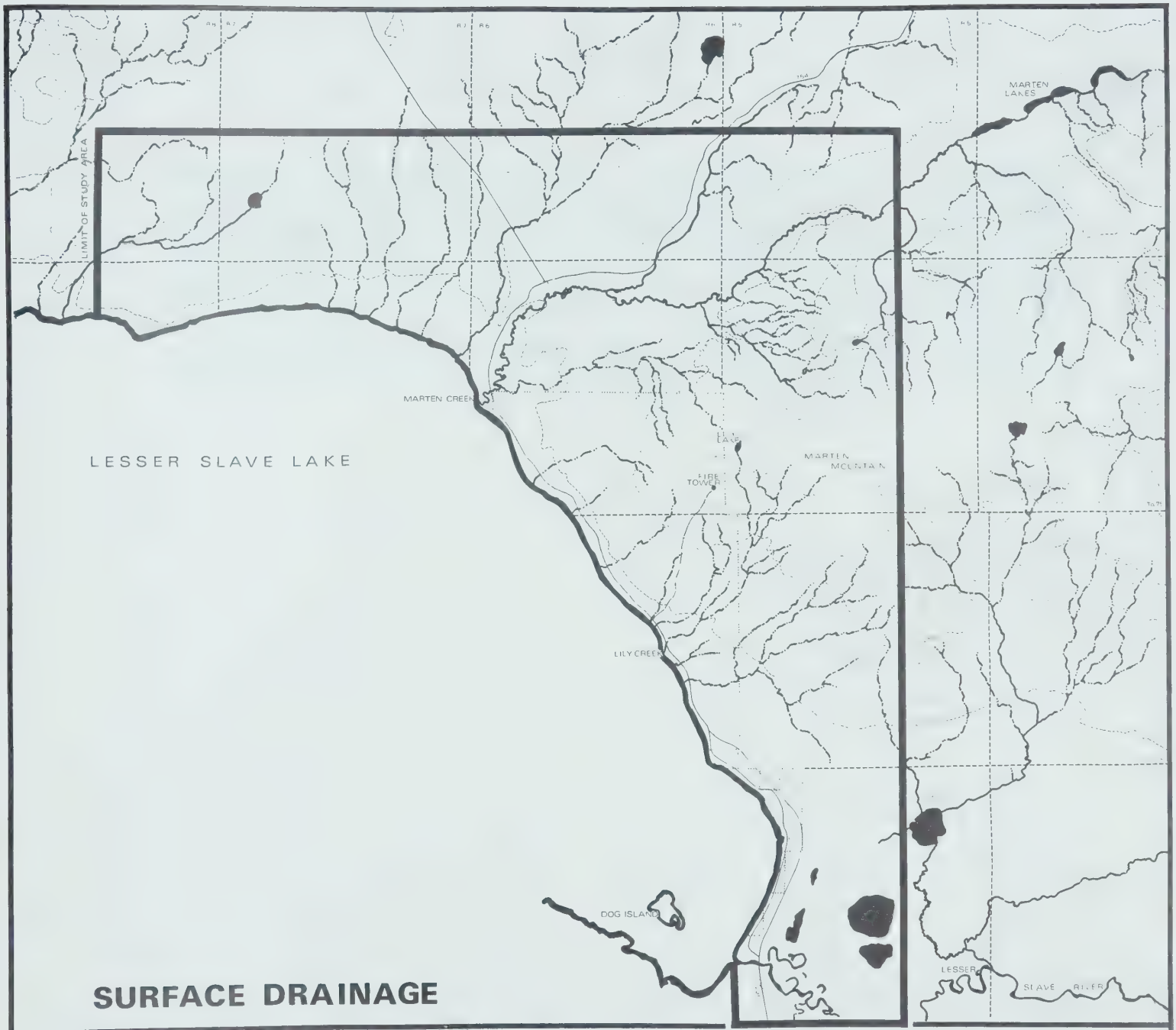
5. Organic Deposits. Muskegs and bogs are well developed in the area. Two broad types of bog are recognized - sedge and peat. Localities of organic accumulation have probably existed in some places since disappearance of the ice and glacial lake and possibly may be up to 11,000 years old. The maximum thickness of bog material is unknown but in other similar areas, a thickness of 30 feet is not uncommon.

6. Slump Deposits. Large earth slumps occur in several areas in the park. Slump topography is common along the upper reaches of Marten Creek and near Lily Lake. Small landslides also occur at lower elevations, principally in association with near-surface occurrences of the Bearpaw Formation.

DRAINAGE

Drainage is poorly developed in the area but the watershed of Lesser Slave Lowland is close to 6000 square miles in area. Lesser Slave River is the main stream channel and originates at the southeast corner of Lesser Slave Lake. It flows 35 miles to the east where it meets the Athabasca River which eventually drains to the Mackenzie River and the Arctic Ocean. Lesser Slave River moves slowly through an entrenched sinuous channel that is quite picturesque and characterized by frequent meanders. Available hydrologic data for the years 1963 - 1970 inclusive is given in Table 1.(p.16)

Marten Creek is the only other sizeable stream in the park. It meanders through a preglacial buried valley that is much too large for the width of the channel; Marten Creek is, therefore, referred to as an underfit stream. Numerous small creeks occur in a dendritic pattern radiating out from Marten Mountain. Most of these creeks occupy youthful poorly developed channels and have intermittent stream flow. Some very small creeks disappear below surficial material at the main break in slope at the base of Marten Mountain. The low flat plain south of Marten Mountain is underlain by highly impermeable lacustrine clay and exhibits extremely poor drainage. At one time in the not too distant past this low lying ground was probably subject to periodic flooding and may still be partially susceptible to this hazard.



SURFACE DRAINAGE

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NORTH

0 1 MILE 6

LESSER SLAVE RIVER NEAR ITS MOUTH

GROUNDWATER

Fundamental information on potential groundwater aquifers is very sketchy at this time, but enough is known to recognize the need for a detailed systematic evaluation of this important resource.

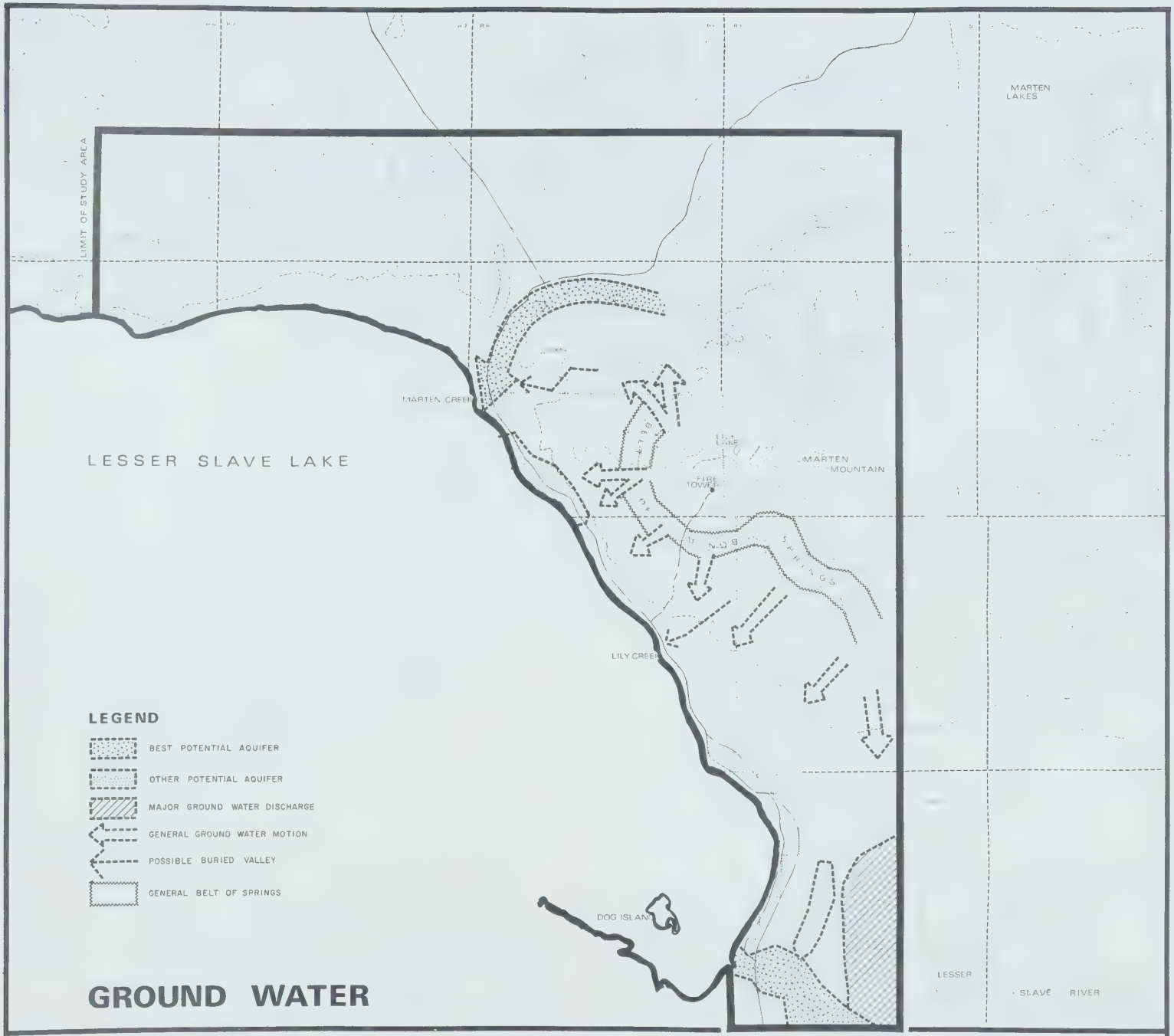
1. Potential Aquifers - Potential aquifers include buried valleys, alluvial terraces, some beach deposits, dune sand and Saskatchewan Sands and Gravels. Location and distribution of these aquifers is given on the accompanying map.

Buried valleys are believed to occur along Lesser Slave River and Marten Creek. Theoretically these aquifers would yield good quality water from a granular deposit below the till and overlying the bedrock. The alluvial or outwash terraces along both of the streams are also potential aquifers.

Beach deposits mapped as pebbly sand (silt and youthful vegetation) may present the best potential sources of water (infiltration from lake) for nearshore developments. Raised beaches and dune localities are also potential aquifers but in all areas where the aquifer is shallow, the supply may contain too much organic material and may be susceptible to pollution if poorly developed.

Although the Saskatchewan Sands and Gravels is an aquifer, it is of no direct value for development. However, this granular deposit forms a porous filter all over the top of the Marten Mountain Upland and indirectly affects the occurrences of springs along the adjacent hillsides. If one or more of these springs could be discovered an excellent water supply could be developed.

2. Investigation Recommended - The whole problem of a water supply must necessarily receive considerably more intensive evaluation coordinated with the master plan of development. At present however, there are too many questions to allow further speculation. It is strongly recommended that a comprehensive investigation of groundwater and other water supply-sewage consideration be undertaken immediately by a team which would consist of a groundwater geologist and a sanitary engineer in order to arrive at an accurate solution to this problem.



GROUND WATER

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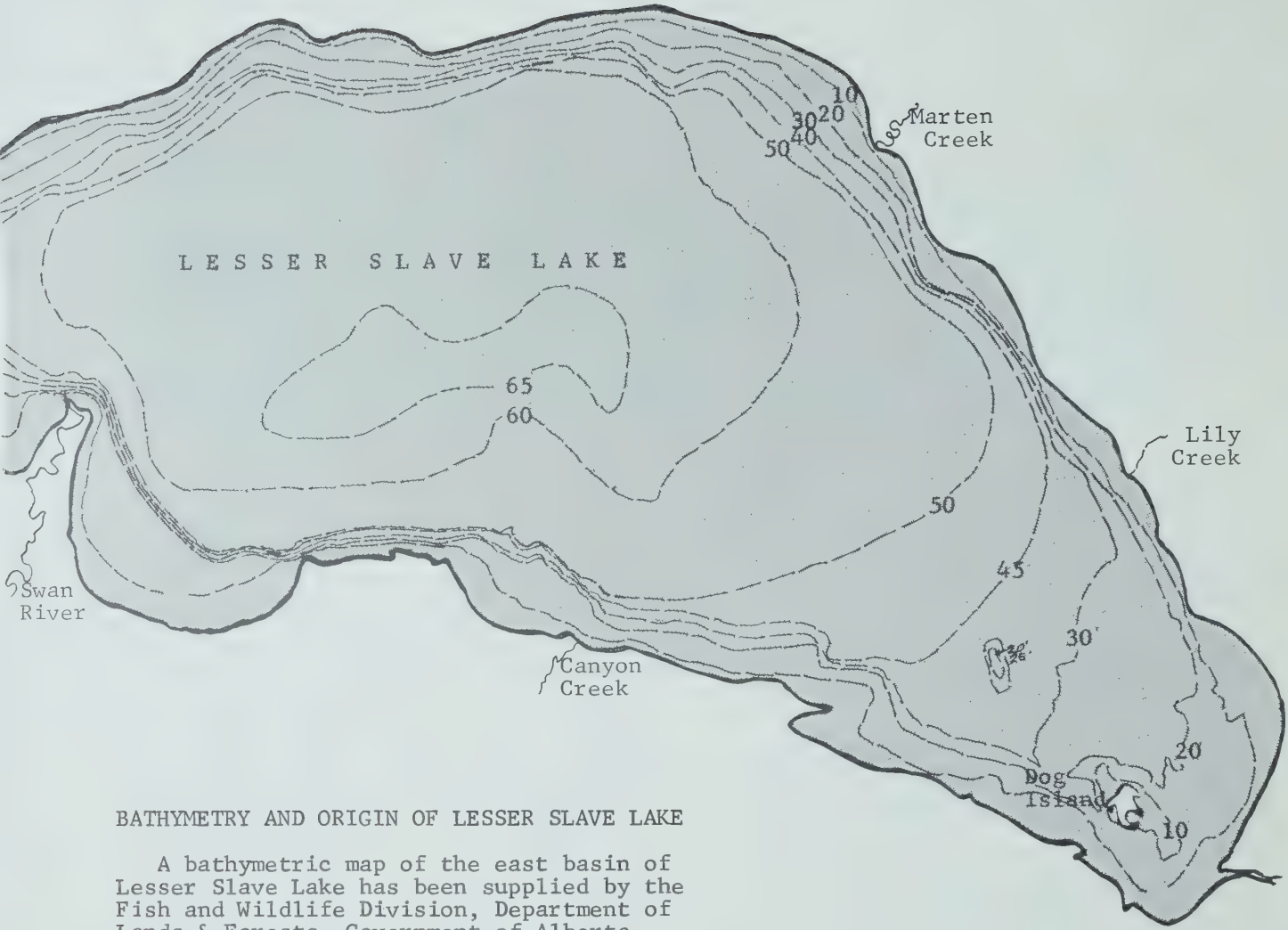
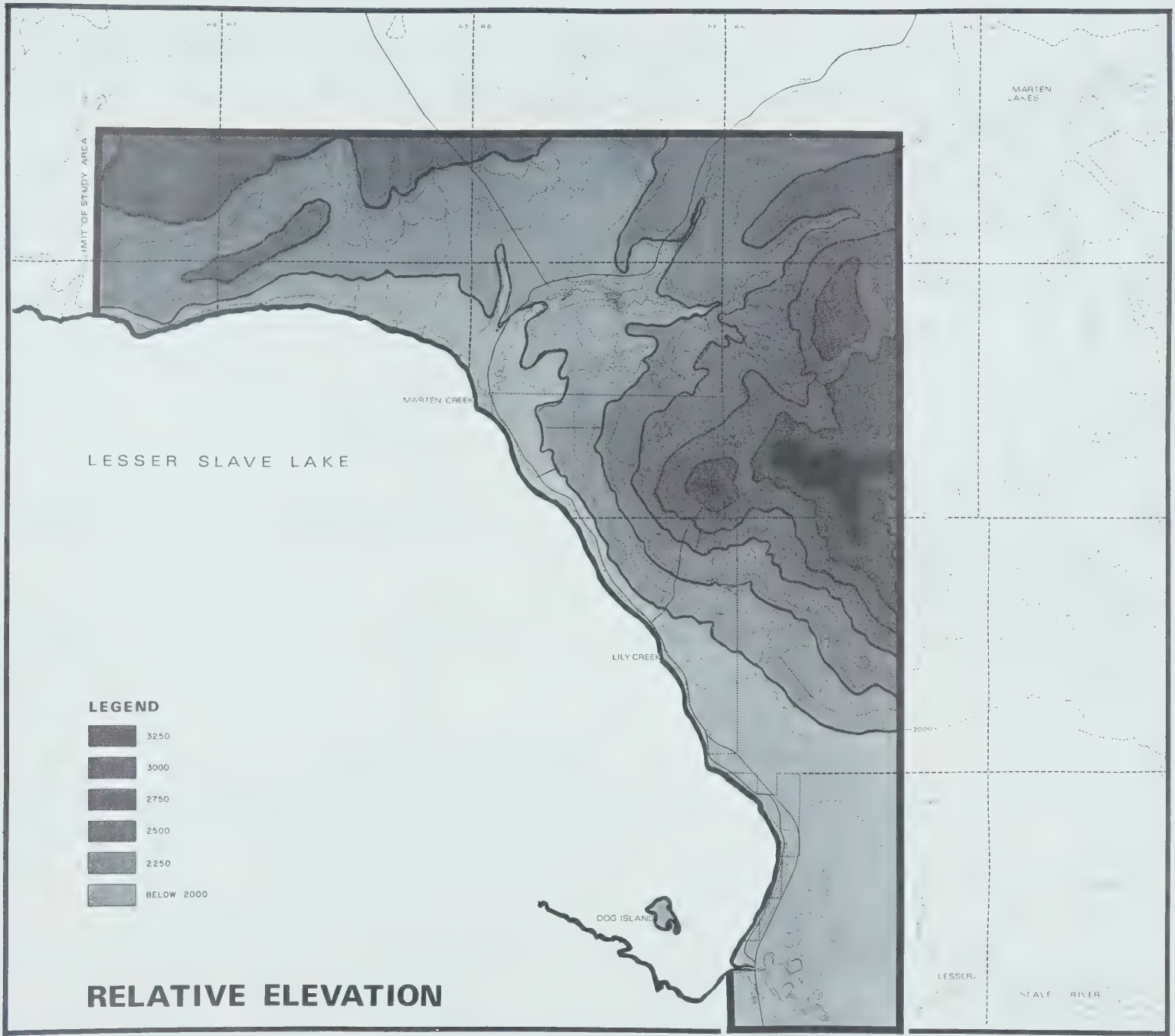


BATHYMETRY AND ORIGIN OF LESSER SLAVE LAKE

A bathymetric map of the east basin of Lesser Slave Lake has been supplied by the Fish and Wildlife Division, Department of Lands & Forests, Government of Alberta. The contours reveal a broad spoon-shaped basin flanked by steeper slopes. The basin was very likely carved out by a lobe of an advancing glacier during the Ice Age. Southeast of Dog Island the lake is from 0 to 30 feet deep. The existence of the shallow area which is aligned nearly parallel with the dominant wind direction partly explains the development of extensive beach sand deposits along the southeastern shore in that sediment transport is directly onshore at this location.

Lesser Slave Lake is suspected to occupy a major preglacial valley which was originally connected to the preglacial Peace River drainage system. Modifications as a result of the last glaciation created the lake basin and also caused the establishment of an easterly overflow outlet represented by Lesser Slave River.



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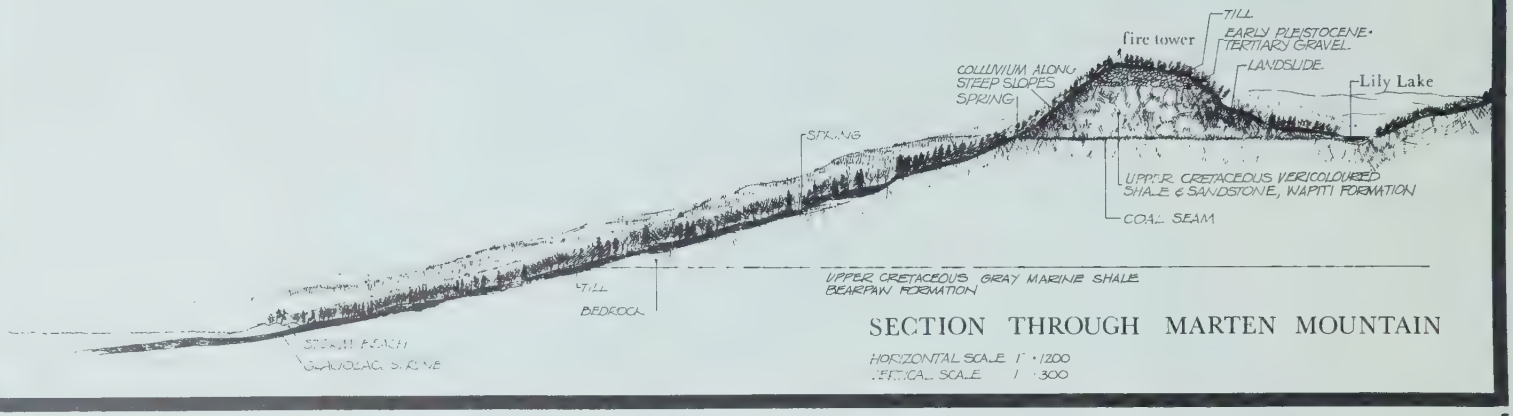
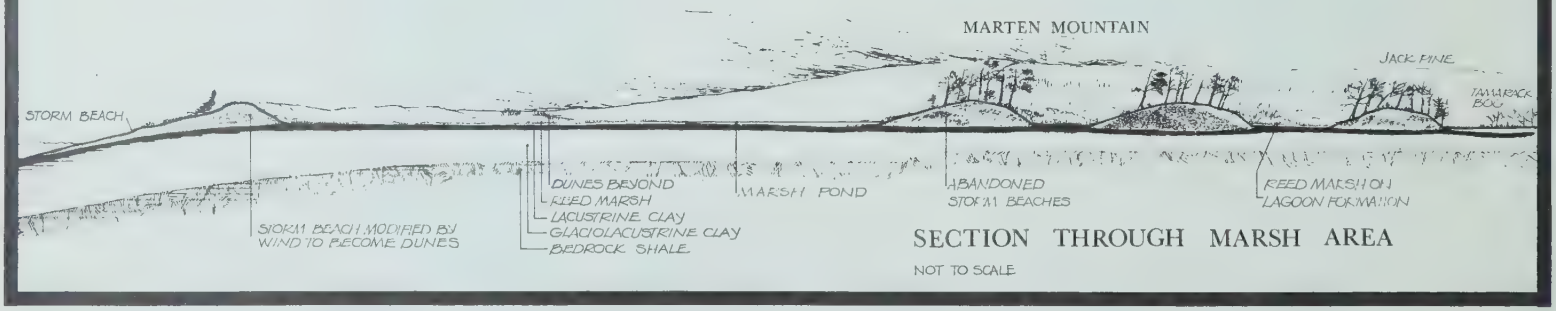


SECTION THROUGH MARTEN MOUNTAIN

HORIZONTAL SCALE 1" = 1200
VERTICAL SCALE 1 = 300



SECTION THROUGH MARSH AREA

NOT TO SCALE

ILLUSTRATIVE SECTIONS

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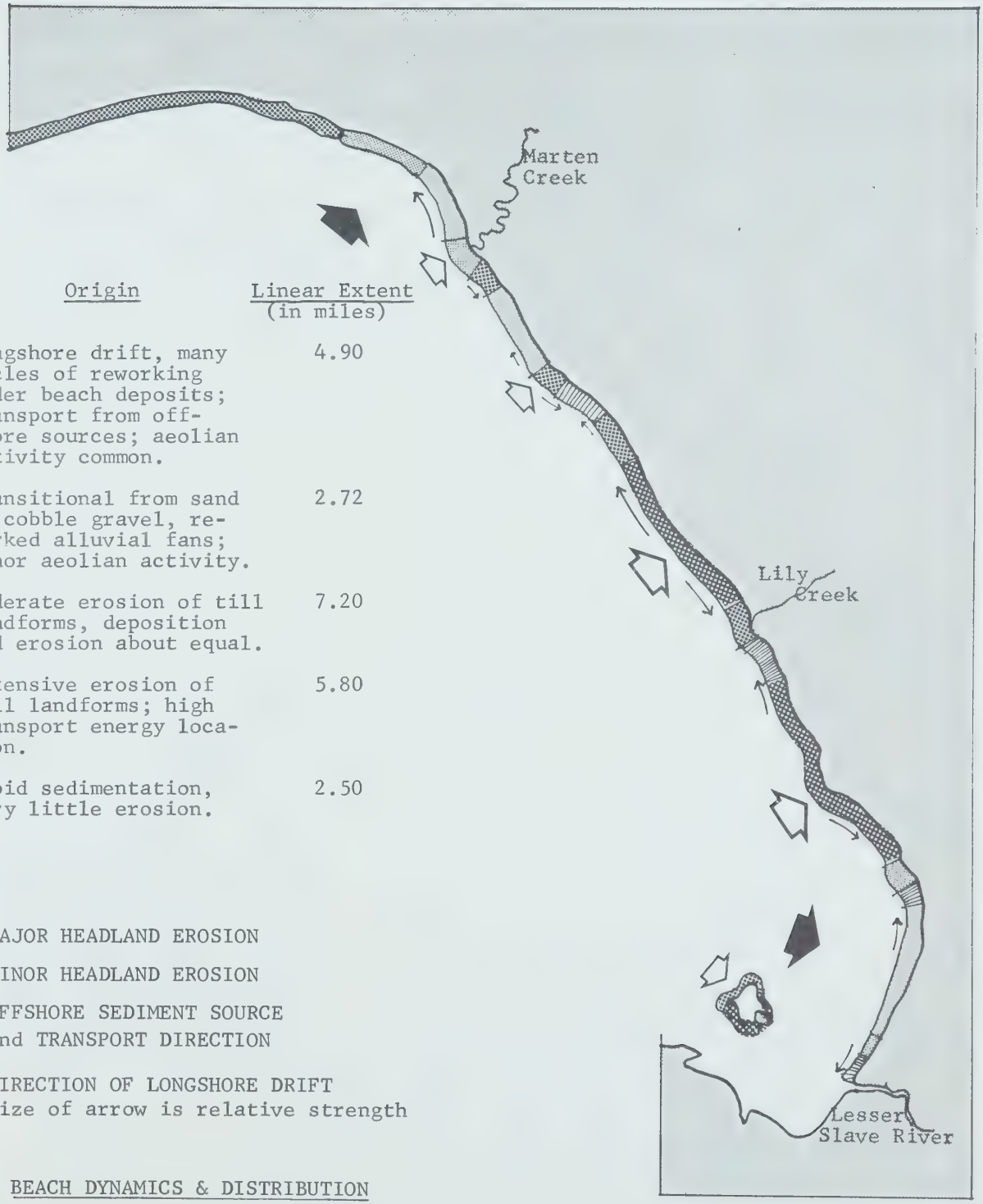


Beach Material	Origin	Linear Extent (in miles)
SAND	Longshore drift, many cycles of reworking older beach deposits; transport from offshore sources; aeolian activity common.	4.90
PEBBLY SAND	Transitional from sand to cobble gravel, reworked alluvial fans; minor aeolian activity.	2.72
COBBLE GRAVEL and SAND	Moderate erosion of till landforms, deposition and erosion about equal.	7.20
COBBLE to BOULDER GRAVEL	Intensive erosion of till landforms; high transport energy location.	5.80
SAND, SILT, GRAVEL, ORGANIC	Rapid sedimentation, very little erosion.	2.50

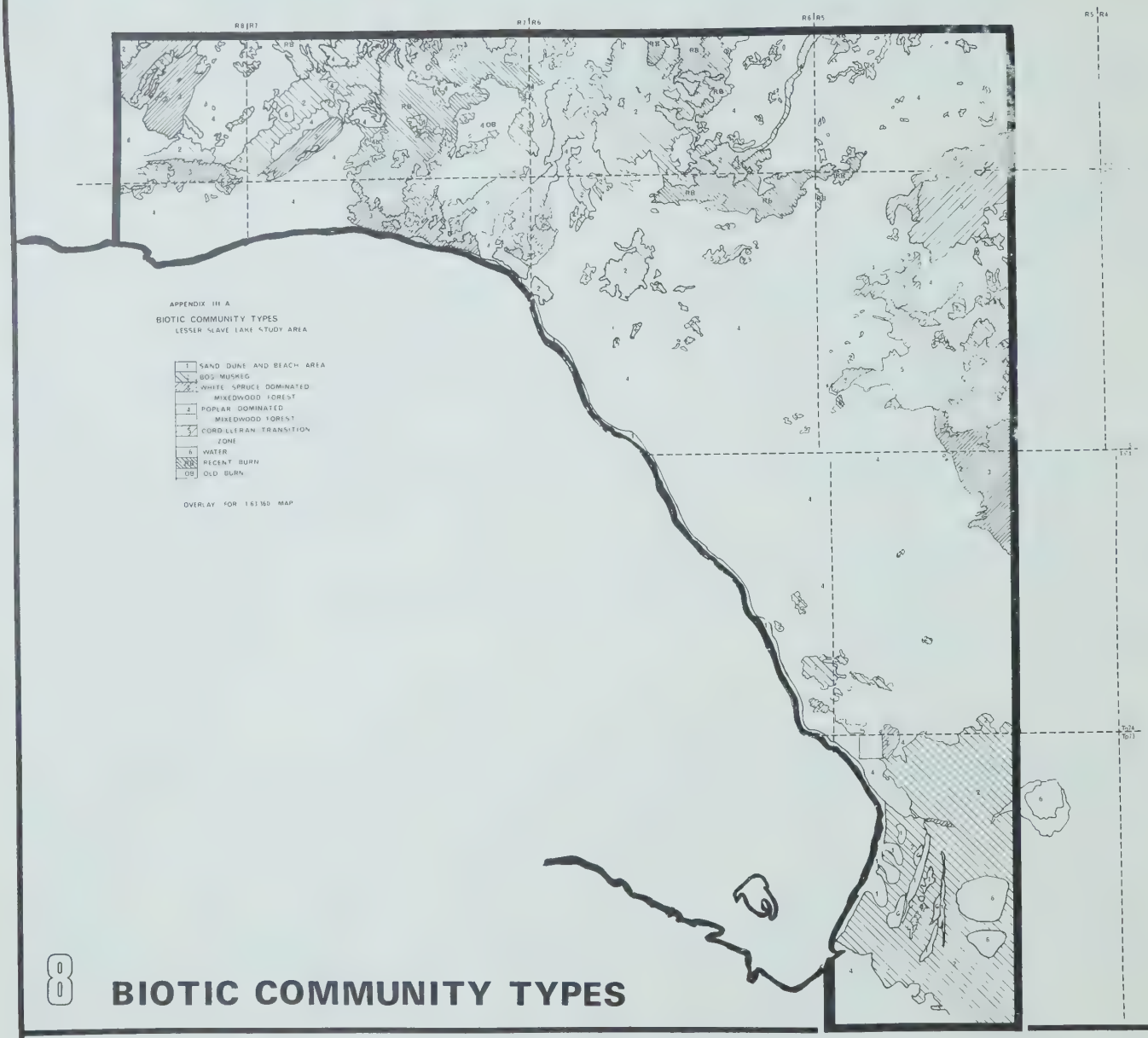
MAJOR HEADLAND EROSION

MINOR HEADLAND EROSION

OFFSHORE SEDIMENT SOURCE and TRANSPORT DIRECTION

→ DIRECTION OF LONGSHORE DRIFT size of arrow is relative strength

BEACH DYNAMICS & DISTRIBUTION



8

BIOTIC COMMUNITY TYPES

MASTER PLAN STUDY

EAST LESSER SLAVE LAKE PROVINCIAL PARK

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NORTH

0 1 MILE 5

BIOTIC COMMUNITIES

INTRODUCTION

The study area surrounding Lesser Slave Lake Provincial Park is locally unique and of considerable interest both from an ecological and an aestnetic point of view. The nature of the topography and climatic influences of the region have worked together to create an area of transitional zones, common in their own right, but very distinct when looked at as a sequence or pattern. Within the small area represented by the study, six major distinct but interwoven biotic communities can be noted. These are:

1. Sand dune and beach area
2. Bog-Muskeg
3. White Spruce Dominated Mixedwood Forest
4. Poplar Dominated Mixedwood Forest
5. Cordilleran Transition Zone
6. Water (Aquatic Zones)

This discussion will correlate the factors of topography, soil and drainage, with the vegetative and faunal components of the various environments throughout the park in order to show the importance of ecological relationships and the care that must be taken in preserving them.

The areas outlined above are distinct, but an ecosystem approach takes into account not only small herbivores of low mobility (mice) but also deals with predators whose range of mobility is much greater (lynx). The totality of interlocking systems must be considered. This report deals with the individual patterns of flora and fauna and the relationship of these to the total ecosystem represented within the study area boundaries.

SOILS

Soils of the region are predominately Podzolic (greywooded). Some Gleisolic (organic peat) soils occur in Bog-Muskeg areas, and some Brunisolic (acid brown wooded) soils occur in areas at higher elevations. The distinction of grey and brown wooded is based primarily on the difference in soil moisture retention: grey wooded are on sand or sandy-loam textured sites where moisture can easily percolate through; brown wooded are found on sandy loam to loam sites where the finer material allows for higher moisture retention. As soil moisture is a key factor in plant growth, this is important in delineating vegetative types and thus animal habitat. The Gleisolic soils (organic peat) are derived mainly from sphagnum moss and makes up the soil composition of most of the bog-muskeg classification of vegetation.

Although a total correlation of vegetative types with soil types cannot be made due to the wide range of adaptability of many of the plant species in the area, the sequence of parent-material, soils, vegetation and animals becomes useful in delineating some ecological sub-regions and relationships that result from them.

Soil development and plant growth is also dependent on the climatic factors influencing the environment. The climate of the study area is typical of the region. Average potential evapotranspiration (measure of heat supply available to evaporate and transpire moisture where soil moisture supplies are not limiting) of 14-18" is comparatively low. Average actual evapotranspiration (measure of actual evaporation and transpiration where average soil moisture storage capacities (4") are present) of 14-16" is relatively high compared with the rest of the province. It is these two factors which limit the

development of vegetation type. Wind direction is west and southwest. There is a slight modification of temperature and macro-climatic conditions due to the proximity of Lesser Slave Lake.

PLANT & ANIMAL COMMUNITIES

Although each of the biotic communities within the study area is unique, there are ecotonal gradients which effect both flora and fauna. The boundaries between biotic communities are not all clear cut. They overlap each other and/or small pockets of one type are found within a larger region. As a result, animals and plants normally associated with only one vegetational type will form an ecotone or "fringe" area with another.

As can be seen from the map, the study area vegetation is mainly Poplar-(Populus tremuloides Michx) dominated or White spruce (Picea glauca /Moench 7 Voss) dominated Mixedwood forest. In these areas, particularly along the major stream courses, such animals as moose (Alces alces) and whitetail deer (Odocoileus virginianus docatensis) predominate. Others, such as woodland caribou (Rangifer caribou sylvestris), (Richardson, Soper, 1964), mule deer (Odocoileus hemionus hemionus) and black bear (Ursus arctos americanus) (Rausch) 1953, can be found on occasion. Fur-bearing carnivores such as wolf (Canis lupus), lynx (Lynx canadensis) and coyote (Canis latrans) can also be found. The area of Marten Mountain - classified as Cordilleran Transition zone-also sees an influx of these mammals; but the relationships change. In the winter, moose tend to ignore the Marten Mountain Plateau and concentrate along the 2800'-3000' contour ridge of Marten Mountain. The bog-muskeg again brings a change in vegetation and a change in animal preference. Normally moose would occupy much of the treed muskeg (Black-spruce-Sphagnum moss association) with smaller mammals in the bog-muskeg area. In this area though, moose show definite preference for burn area.

The sand dunes and beach area, due to their low soil moisture retention and generally level topography, again show different plant associations. Hardy perennials are found, with low shrub at the edges of the environment; Jackpine (Pinus Banksianna) trees recolonize the area of stable sand dunes.

Again, although the communities are unique within themselves, they do overlap. Due to changes in parent material/soil or slope/drainage, (or a combination of these factors) the biotic communities appear as distinctly representative of type or of the ecotone. These factors will be dealt with in the body of this section.

A. Aquatic Habitats

1. East Basin of Lesser Slave Lake

The shore zone of the lake that will border the park is windswept owing to its position in relation to the prevailing winds and as such is subjected to heavy wave action. In addition, the shoreline is relatively regular (i.e. minimal shoreline development) and therefore provides few instances of shelter in the form of coves or bays. The above features preclude any extensive littoral development in the shore zone which is essential for the maintenance of substantial fish populations in the immediate area. In addition, hazardous boating conditions, due to the wind and the resultant wave action, will limit the mobility of anglers (K.A. Zelt, pers. comm.). Walleye and northern pike are the most important game fish present in the east basin, however, populations of both species are not large and would provide a rather limited sport fishery.

2. Streams and Rivers

Streams within the proposed park area will not provide a substantial sport fishery due to their small size and hence restricted capabilities. Streams and rivers in the surrounding area support populations of Arctic grayling, walleye and norther pike but probably would not support intensive angling pressure on a sustained yield basis (K.A. Zelt, pers. comm.).

3. Summary

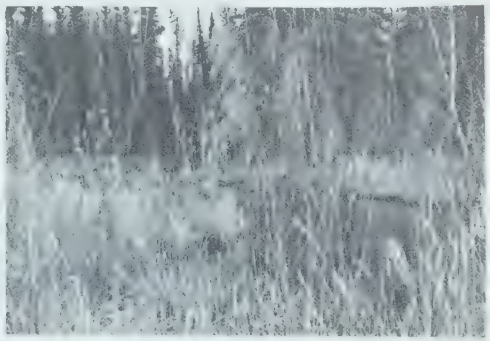
On the basis of the existent fishery capabilities of the east basin and the nature of streams and rivers in the area it is unlikely that the park will provide substantial angling to its patrons. However, in light of the comprehensive study currently being undertaken by the Alberta Fish and Wildlife Division on limnological aspects of Lesser Slave Lake, it is possible. There will be an increased sport fishery.

76-7-W5; 76-6-W5) of the study area are dominated by bog-muskeg and/or treed muskeg. As well, the areas of Mixedwood forest (both aspen and white spruce dominated) contain large tracts of slow growing black spruce-muskeg and larch (Larix laricina) swamp which cover the more poorly drained flats and lowlands. These bogs are characterized by Sphagnum moss with black spruce as the dominant tree and Labrador tea (Ledum groenlandicum) as the main shrub. As this area was found to be typical of bog types, the following quote aptly describes vegetation.

"The black spruce-peat moss (Picea mariana-Sphagnum) association frequently has larch, paper birch and certain willows associated with the spruce. The floor is characterized by bog mosses, especially Sphagnum species, and by Cladonia species. The chief flowering plants are Ledum groenlandicum, Vaccinium vitis-idaea, var. minus, Rubus chamaemorus and Smilacina trifolia. The most striking structural feature is the uneven floor of Sphagnum mounds and the nearly continuous cover of Labrador tea. This association has developed in depressions through acid-bog stages and has produced a considerable thickness of Sphagnum peat. It is interpreted as a sub-climax community, maintained as such by prevailing edaphic conditions and by periodic burning." (Moss, 1955).

REED FENS

LARCH MUSKEG



BLACK SPRUCE MUSKEG

B. Terrestrial Habitats - Plant Associations

1. Bog-Muskeg Zones and Associated Mammals

The lowlands of the southern end and the northwestern sections (73-5-W5;

The successor to this would be a black-spruce-feather moss association. In the study area, this is found at the treed-muskeg-aspen mixedwood ecotone, but due to the relatively high incident of burns in this vegetational type, the association is limited in development. An extensive area of birch (Betula papyrifera Marsh) stands is found at the northern extent of the southern bog-muskeg area. (74-5-W5)

The bog habitat is of low productivity. There is only a limited number of plant species and these are not used as preferred feed by any of the large or smaller herbivores. Rather, the area is home to a small variety of fish, insects, voles and shrews, (e.g. Athabasca red/back vole; American saddle-backed shrew) and some birds. The water area of bogs though, have a wide variation and intense growth of desmids with some blue-green algae. Some amphibians (Ranidae) also reside here.

On superficial observation the bog area appears almost totally unproductive. Yet it supports insects and small mammal life to such a degree that the observant viewer can see much activity and interaction.

2. Spruce Dominated Mixedwood Forest and Associated Mammals

The spruce and poplar dominated mixedwood forests are separate and distinct in nature.

"Environmental conditions of the mixedwood forest make it clear that trembling aspen and white spruce trees are as different in their influences on their surroundings as they are in appearance. The contrasting effects of deciduous broad leaves and evergreen needle are of critical significance. The amount of solar energy reaching the aspen stand interior is greater at all seasons, and much greater after leaf fall than that percolating through the relatively unchanged spruce canopy. As a result, total synthetic production and consumer food supply can be far higher among the shrubs and herbs under the aspen trees than is possible for the feather mosses under the spruce canopy. In the spring, direct heating of the aspen forest floor by the sun quickly melts the snowpack and warms the soil. In the white spruce stand, the melting processes take longer since it is caused only by the diffused light from the sky and the indirect conduction of heat by air and rain." (La Roi, 1966).

The late arrival of heat, the protective nature of the white spruce canopy and the type of litter (i.e. spruce needles as opposed to leaves) all combine to form a habitat which most mammals prefer to avoid. This appears to be the case on the North Slope of Marten Mountain. The "cushion" effect of the accumulated ground cover in a spruce forest indicates that (a) a few animals eat the spruce needles, which are tough and acidic, and (b) that these needles are slow to decompose. The canopy prevents light from entering and the needle carpet allows water to percolate slowly through it. The result is a leaching of plant nutrients through the ground cover and soil to form an acid-rich and nutrient-poor soil and rooting medium. Most plants found in the aspen-dominated forest have little tolerance for the conditions of this soil Moss and fungi do, however, grow in the spruce duff. The fungi, which feed on dead or organic materials, are particularly prevalent. For them, this is a healthy environment.

The following description of the white spruce forest can generally be said to hold true for the study area.

"The associated trees and shrubs are rather few and sparsely scattered. They include Balsam poplar (Populus balsamifera), Red-osier dogwood (Cornus stolonifera), Highbrush cranberry (Viburnum edule) and species of willow (Salix), gooseberry (Ribes) and rose (Rosa). The herbaceous and moss flora is variable and generally patchy. Where the spruce forms a close canopy, there is usually a continuous ground cover of various mosses, chiefly Hylocomium splendens, Hypnum schreberi and Ptilium crista-castrenis. Where the stand is more open, this characteristic "feather moss" stratum is not so well developed, and certain herbs are often abundant there; these include Twinflower (Linnaea borealis var. americana), Horsetail (Equisetum spp.), Marsh reedgrass (Calamagrostis canadensis), Bunchberry (Cornus canadensis), Bishop's cup (Mitella nuda), Dewberry (Rubus pubescens) and Wintergreen (Pyrola spp.). White spruce is said to be the natural successor to balsam and aspen poplar and to behave as a climax species of the region." (Moss, 1955)

As already indicated, animals prefer not to feed on spruce needles or in spruce wood where shrub vegetation is minimal. Therefore, those mammals that inhabit the area are usually found in the ecotone of the aspen stands. As a rule, mammals do not inhabit the pure stands of white spruce within the white spruce dominated mixedwood forest. The ecotone contains such mammalian wildlife as squirrels, hares, whitetail and mule deer, black bear, porcupine and other animals indigenous to the mixedwood forest.

3. Poplar Dominated Mixedwood Forest and Associated Mammals

The aspen poplar dominated mixedwood forest, as seen from the vegetation map, is the largest single type appearing in the study area of Lesser Slave Lake Park. As already noted, the relatively open canopy left by the deciduous trees is conductive to the early melting of snow; raising of soil temperature; and to good, direct lighting which promote early leafing and flowering of an almost continual understory of shrub and herbs. The leaves of these plants are not left to accumulate, as with spruce needles, but are eaten by herbivores or readily decomposed, adding nutrients to the soil and thus increasing, or at least sustaining, healthy plant growth capability.

Moss (1932) has recognized two poplar consociations (Aspen poplar and Balsam poplar) within the general poplar association. To the association he gave the following description:

"Typically, the poplar association consists of five strata: (a) smaller trees and larger shrubs, an intermittent layer, usually poorly developed in the aspen consociation; (c) lower shrub layer, rich or sparse, and more or less obscurred in summer by the next stratum; (d) taller herbs, often an almost continuous stratum and quite prominent in the latter part of the growing season; (e) lower herbs, including mosses and lichens, forming a carpet which locally is continuous, especially in balsam poplar consociation. Bands of mosses, especially Pylaisia polyantha are common on tree trunk bases."

The mammalian inhabitants of poplar association are many and varied. They include both herbivores and carnivores. The dominant ungulate is the moose; Mule deer and a few whitetail deer are also present. Woodland caribou are sometimes found around the northeast section of the study area. The American Black bear regards this as prime territory, while there have been sporadic incidents of grizzly bear (Ursus arctos horribilis) (Rausch, 1953) sightings. Major carnivores are the wolf, coyote, lynx and wolverine (Gulo lusous) while minor carnivores are the fisher (Martes pennanti), weasels (Mustella spp.) and otter (Lutra canadensis). Common also are American carying hare (Lepus americanus americanus), and rodents of the subfamily Microtenae.

4. Hybridized Mixedwood Forest and Associated Mammals

Another association of great importance to the mixedwood region is the area of "hybridization".

The mixedwood forest usually has only small clumps of pure aspen poplar or white spruce. The remaining area is made up of a combination of the two with white spruce or poplar dominating Thus, there is a layering effect (in vegetation) caused by the two representative types of vegetation.

La Roi (1966) states:

"Layers under mixed canopies are in many respects predictably intermediate or transitional in appearance but in other ways quite different. Certain plant and animals species with only feeble representations in most spruce and aspen stands (such as the Ruffed grouse) are much more common in areas where the two trees are intermingled. Other species are present here but missing entirely from pure spruce and aspen types. Part of the explanation appears to lie in what has aptly been called hybridization of the habitat. There are two aspects to such hybridization - quantative and qualitive. The former is easily understood, for it simply refers to the production of environmental conditions, light, for example, of which the intensities are between those of either pure aspen or pure spruce. Species better adapted to such intermediate habitats will prosper in them, often at the expense of competing species. The qualitive aspect refers to synthesis of different kinds of habitat conditions or components from precursors in the pure spruce and pure aspen stands. A simplified example will illustrate this. Some of the organic products of decomposition in a mixture of decaying aspen leaves and spruce needles do not occur in either unmixed rotting aspen leaves or unmixed old spruce needles. These new organic compounds form necessary links in the food chain of decomposer micro-organisms which now proceed to convert the litter into a distinctive kind of humus found only under mixed canopies. This new humus is a favourable rooting medium for several flowering plants which do not occur either in aspen or spruce stands. The humus also tilts the competitive balance in favour of certain species which were of only minor importance in the pure stands."

Animal associates which frequent this environment are much the same as found in the aspen dominated mixedwood stands. As Moss (1955) has indicated, however, certain species find this a more convenient area in which to compete successfully for survival. Thus, the area of hybridized mixedwood forest is the most productive in terms of variety of plant growth and potential for animal development.

5. Lodgepole pine-Jackpine Forest and Associated Mammals

The Lodgepole pine-Jackpine forest association forms the Cordilleran Transition region found on the map. Although this area is relatively small, within the study area it represents a major vegetational community that is worthy of preservation. Occurring in limited locations at and around the high ridges of Marten Mountain, this association represents one of the few Cordilleran Transition zone areas found this far to the east of the Rocky Mountains. Other areas similar in nature are the Cypress Hills and Caribou Mountains.

The Lodgepole pine-Jackpine association is represented also in the stable sand dune area in the southern section of the study area. Here Jackpine (Pinus Banksiana) acts as recolonization species in these delicate areas. Moss's (1955) description makes the following observations:

"The pine vegetation in the greater part of our Boreal Region is probably best treated as one community and given the status of an association (Moss, 1953a). Within this association two consociations

Jackpine on an abandoned beach

may be recognized: the Jackpine and the Lodgepole consociations, on the basis of species dominance. For each of the consociations a number of faciations may be distinguished by their ground cover. Two of these faciations are quite prevalent and rather well defined; (a) pinefeather moss faciation, on the moist and more shaded sites, characterized by Hylocomium splendens and Calliergonella schreberi, along with various higher plants such as Linnaea, Pyrola spp., and Cornus canadensis; (b) pine-heath faciation, on the drier and more open parts of stands, characterized by Arctostaphylos uva-ursi, Vaccinium vitis-idaea, Elymus innovatus, Oryzopsis pungens, Polytrichum spp. and Cladonia spp. Common to both faciations are several species, including Alnus crispa, Rosa spp., Salix spp. and Maianthemum canadensi."

Mammals found in this community include American black bear, red squirrel, lynx, moose and other animals found in the lower altitude mixedwood forest sections of the study area.

C. Animal Component Reaction

The animal reacts either negatively or positively to the ecosystem. Each has its place within the trophic levels and energy consumption and production is directly associated with the total condition of the ecosystem. As in any ecosystem the study area is composed of energy convertors: Primary Producers (soil bacteris); Secondary Producers (plants); Primary Consumers (herbivores) and "Summit" Consumers (carnivores and omnivores). The herbivores are on higher trophic levels than are the plants but they are very dependent on the type, amount and condition of vegetation available to them. The carnivores depend upon the herbivores for survival. Wildlife species found within the study area will be discussed as to habitat and ecological niche in the appendix.

D. Plant and Animal Succession

1. Triffer Factors Which Cause Change in the Ecosystem

From the description alone of the various plant communities and animal life throughout the study area it might be concluded that the whole region is in a static state. This is not the case; there are constant and dramatic and/or subtle changes occurring continuously throughout the ecosystem. The study area shows definite evidence that pyric factors strongly influences ecosystem dynamics. Shown on

the map are areas of "old burns" and areas of "recent burn". Other natural factors that more subtly influence the ecosystem are climate and biotic changes due to grazing or browsing.

a.) Fire: Fire is one of the most notable factors in ecosystem change -- mainly because the scars are so obvious. Whereas conditions such as soil erosion can be almost overlooked until a major slump occurs, a burn area shows blackened timber and a different growth of vegetation. Although seen by some as a terrible occurrence, fire is nevertheless one of the nature's ways of maintaining the mixedwood forest association and its animals.

Fire changes the plant ecology in a number of ways. In an aspen dominated mixedwood area: "A poplar stand that has been burned off is usually soon replaced by a dense growth of young trees, with only a temporary alteration in the associated vegetation. Certain species, including Fireweed (Epilobium angustifolium), Aster spp. and some of the shrubs and grasses become quite prominent; but after two or three years, these are suppressed by the young poplars and there is a gradual return to the original composition of the community." (Moss, 1955).

The spruce in such forest areas have little chance of becoming dominate. Usually seed reproduction does not start until the tree is at least 35 years old and usually longer (45-60 years); the aspen, however, reproduce by suckering from the root crowns. However, an intense fire can consume the humus layer of the aspen forest, reduce vigor of the aspen suckers, eliminate minor vegetation and expose the mineral soil. The small seeds of the white spruce can gain a foothold under these conditions and invade the aspen sites. A spruce stand with scattered poplar would result.

In a jackpine association a fire would serve to aid in continuation of the association. "Fire is not a requisite for seed release from closed cones in the slash (9,70). Usually the resin that seals the scales together melts at 113°F. (45 C) (16), allowing the scales to flex and spread apart. This can occur without fire when enough heat reaches the cone surface through radiation, convection or conduction (20). However, fire may hasten the opening of some cones that are not suitably positioned for the resin bond to be softened by solar heat." (Fowells, 1965)

In bog areas a burn or repeated burn can be retrogressive to an earlier, less productive bog-type.

b.) Climatic Factors: A minor alteration in micro-climate can cause a slight vegetational change within an area. If this same alteration is repeated for a number of years, a marked vegetational change may result. This in turn could influence the animals habitats of the area in question.

Within the study area there appears to be no trend toward wetter or drier conditions although some minor micro-climatic changes have occurred. For example an extremely wet spring can result in expansive growth of plants along the ecotone of the dune-beach-forest regions.

Early or late rise in soil temperature can effect to a minor degree whether certain species, mainly perennials and shrubs, have a lengthy growing season or a short season.

c.) Biotic Factors: The Biotic factors of excessive grazing and browsing can cause severe problems and changes in an ecosystem. Vegetation can be destroyed, soil can be exposed to the elements or caving of hillsides or stream banks can occur. Normal grazing of wild ungulates usually does not overtax the vegetation or injure the soil. When wild ungulates are denied use of key areas due to artifially constructed barriers (such as fenced highway rights of way or wildlife-proof fenced areas used by domestic stock), they must move to marginal regions to obtain needed feed. In this instance, damage may be done to the underlying soil and vegetation as the less productive plant community cannot support the population.

A particularly severe winter or a dry summer could cause herbivores to overgraze or overbrowse, thus taxing the area to a greater extent than habitat conditions can tolerate without damage. This again, could cause an alteration in the ecosystem mechanics.

At this time due to lack of sufficient field study, we cannot state whether any of these conditions occur within the study area boundaries. The land slumps along the ridges of Marten Mountain do not appear to be the result of excessive grazing in the area. The area in immediate vicinity to both the stabilized and active dunes should, however, not be used for grazing of domestic stock due to the delicate balance of the systems and the possibilities of erosion and other disturbance.

The combination of factors - biotic, climatic and fire - can result in a general trend in increased or decreased animal use of the area with the modified environment. Particularly worthy of note is the moose concentration on the areas of recent and old burn within the study zone. Here browse vegetation is easy to obtain and the animals react positively by frequenting the area.

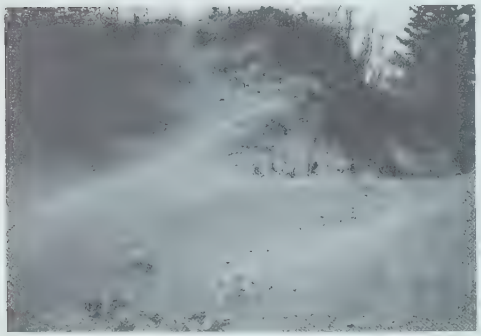
2. Fragile Relationships

a.) Dune areas - Plants and Sand

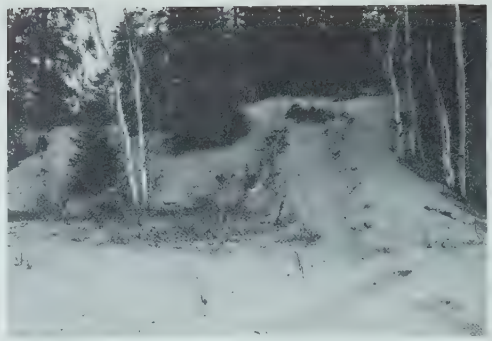
The dune area is formed on glaciolacustrine fine-quartz sand deposits in the southern section (73-5-W5) of the study area, this is one of the most fragile but harsh areas within the area. The well drained sand makes it difficult for any but the hardiest, most xerophytic vegetation to colonize. Fauna is limited as well.

Stabilized dunes show a recolonization of Jackpine. This species is well adapted to its environment and can survive in marginal growing areas. A few forbs and annuals also inhabit the dunes. The balance is delicate, however, and outside disturbance such as trampling by animals or people can cause regression to a more sparse growth. A few birds inhabit the area and burrowing insects and centipods are common.

The active dunes, however, by their very dynamic nature can support no vegetation. Here, again, outside disturbance, while not affecting the vegetation, can change erosion patterns. Due to the restricted occurrence of active sand dunes within the provincial park, it is well to preserve those that do occur as a unique natural feature.



Destruction of ground cover plants by over-concentrated foot traffic has opened this dune to wind erosion.



b.) Highway Rights of Way

The initial road cuts disturb soil and vegetation and thus wildlife. Regrowth of trees is often limited due either to cutting or the use of herbicides. Often alien plants are introduced to stabilize the fresh roadcuts and fills, a practice which is inimical to park purposes.

The initial effect of any roadway is a visual stimulus which acts as a "barrier" to the new element (i.e. the road) is understood by the animals there is usually some hesitancy in crossing, even if feed is better on the other side. In addition, roadways and vehicle use introduce a new element of hazard and death into the animal's existence. Even after the animal is familiar with the road and can usually avoid or successfully cross it, the road still acts as a deterrent to its natural activities.

Road right of way clearing in heavy canopy forests often creates forage conditions which are more favourable, to certain types of wildlife, than the original forest. In this case, the road becomes an "attractive hazard" for wildlife inasmuch as

traffic hazards become a heavy decimating factor. This holds true with ruffed grouse, deer and small mammals which are adapted to the altered habitat. As well, if roadways are constructed in too close proximity to animal feeding, breeding or watering areas, there is a high probability that the animals will retreat to a less disturbed area. In land units which are set aside for the preservation of wildlife (provincial parks and wilderness areas) the intrusion of a roadway, no matter how economically sound for the human society, will strongly affect the natural environment.

Highways are constructed across the streams as well as land. Depending on the volume and velocity of water, either bridges or culverts are used. Often the road follows the natural course of the stream. In both cases, disturbance from added siltation of the stream may prove harmful to the fish population. Culverts may act as barriers to fish movement due to increased water velocity. Spawning grounds may be affected by an improperly drained roadway and the subsequent deposition of silts over gravel areas in the stream during wet seasons. Potential slumping of the banks into the stream must also be considered. These factors should all be minimized in road design before construction begins.

c.) Location of Campgrounds

Campgrounds mean people, cars, trailers tents, boats, grills, pets, noise, smells, and garbage. In many areas, certain wildlife (deer, squirrels, chipmunk, birds) have accepted this into their way of life and adapted to the new source and type of food supply the people offer. Other animals such as the black bear, have taken it upon themselves to fully utilize this food source by taking what is and what is not offered.

Provincial parks cannot, however, sacrifice human recreation and enjoyment to totally unchanged natural habitat. Therefore, campsites are a definite fact of life.

Since there is much activity at a campsite, which is alien to the natural environment, the areas do deserve the definition of fragile relationship zones. Trampled and criss-crossed by numerous feet and cars, the vegetation is bruised and often destroyed. The exposed soil is then subject to accelerated erosion.

One of the high-value criteria of campers for camping is a shady, scenic spot, preferably by a creek or shore. These are the very areas that are worthy of preservation but have been most often used (or rather misused) by building a campground in the middle of them.

For these reasons, care must be taken to not build campgrounds in areas where known fragile relationships exist. There may be some sacrifice of the aesthetic view of the camper to insure preservation of a particular area of ecoligical interest and scenic attractiveness.

IMPACTS OF CERTAIN TYPES OF LAND AND WATER USE

Within the framework of vegetative communities and animal habitats, consideration must also be given to the impacts of land and water usage. This includes highway and road construction, campground development and general occupancy and non-occupancy zoning. For the purposes of these impacts, the study area surrounding and including Lesser Slave Lake Provincial Park can be sectioned into five special management zones. These are:

1. Water Influence Zones
2. Streamside Zones
3. Bog-Muskeg Zones
4. Travel Influence Zones
5. Sand Dune Zones

1. Water Influence Zones

Water Influence Zones in the study area are catagorized by the presence of recreational potential on water bodies. The Water Influence zone is a strip of varying width around water bodies of recreation value, and includes the primary foreground viewing area considered necessary to maintain the aesthetics of the site for water based recreation. An excellent example is the area of Lily Lake and its surroundings.

Management direction should be to manage this zone primarily for recreational and aesthetic values and to protect those values associated with attractiveness of lakeside site conditions and wildlife habitat.

2. Streamside Zones

Streamside Zones in the study area are strips of varying width, usually fairly narrow, adjacent to small streams or major water courses which support fish, have a potential for sport fish, or are considered significant in contributing to natural overland flow of water and good downstream water supply. Marten Creek and Lily Creek and their tributaries would be in this category.

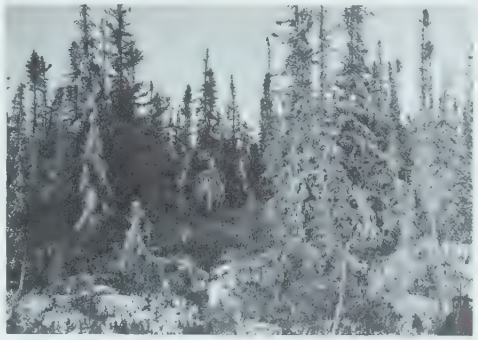
Streamside Zones should be managed for the protection of water quality, especially clear water streams, as quality is at a premium in this region. This applies specifically to domestic use. Streamside vegetation, stream banks and channels should also be reserved. No recreational facilities should be constructed in Streamside Zones. Streamside Zone criteria should apply especially to high value recreational streams which constitute Arctic grayling habitat. Water conditions necessary to sustain quality sport fishing in this zone may be radically altered by poor land use.

This type of recreational opportunity is greatly restricted in the province as Arctic grayling are especially susceptible to siltation and other pollution of streams. Tree cutting should not be practiced in Streamside Zones with the exception of accomplishing public safety from dead, diseased or damaged trees adjacent to high use recreation areas. Reserved strips of vegetation should be a part of any functional plan if relation to vegetation manipulation of any type. Any proposed changes in the Streamside Zone to facilitate transportation, recreation, or seismic activity should be concerned with the affects of other present and potential uses. This applies specifically to the relocation or crossing of streams in connection with highway, road or seismic line construction and development. Studies must take into full account the recreational and fisheries habitat requirements and also the total effect of storage created by the construction of impoundments. Roads should not generally be constructed in this zone except for stream crossings. The delicate balance of soil and vegetation in Streamside Zones complicated by the small particle size of the soils over which the water runs, require very careful consideration before any alteration of the natural condition takes place.

3. Bog-Muskeg Zone

The extent of well-drained soils in the region according to the 1960 soil survey, is somewhat limited; the map area is generally characterized by a high percentage of moss bogs (muskeg). The moss bogs, which occupy perhaps 40 per cent of both the highlands and the lowland areas, have Black spruce (Picea mariana) as a principal tree species.

Some of the organic soils in this climatic region are frozen in depths ranging from 12 to 30 inches below the surface. This condition suggests that permafrost must be considered in organic soils.



In any plan for the alteration of Bog-Muskegs, all costs and benefits must be taken into consideration regardless of whether or not they directly accrue to the planning agency. Included in benefit cost analysis should be consideration for loss of waterfowl habitat and hydrological resources associated with underground storage bases, especially in clay aquifers which are compactible. Peat bogs have a regulating effect in maintaining water levels in streams and local water tables, and in preventing erosion of soil when large volumes of water are suddenly spilled into the stream channel. From this standpoint, management direction should be toward protecting and withholding, from any type of use, these natural reservoirs in the interest of moisture conservation and flood control.

4. Travel Influence Zone

Travel Influence Zones in the study area compromise areas of varying widths along specified highways and roads that transect the region. Travel Influence Zones are designated on the basis of predominating influence of present or future recreation value. This zone also contains primary foreground viewing areas related to those existing and potential recreation sites susceptible to concentrated recreation use and development.

An example of a road which falls into this category is the Wabasca Highway.

Travel Influence Zones are divided into two major types:

a.) Occupancy - containing existing or potential recreation sites and facilities.

b.) Non-Occupancy - the setback strip primary foreground viewing area which may extend considerable distances back from heavily used public roads. This may require modification of resources management in the area adjacent to the Travel Influence Zone.

Travel Influence Zones are classified primarily for the purpose of preservation of recreation and aesthetic values, and the development of sites suitable and needed for recreational travellers. Travel Influence Zones should be established in those areas where travel access is in close proximity to outstanding recreation features such as productive grayling streams, unique scenic features, areas of potential overflow from heavily used recreation areas.

5. Sand Dune Zones

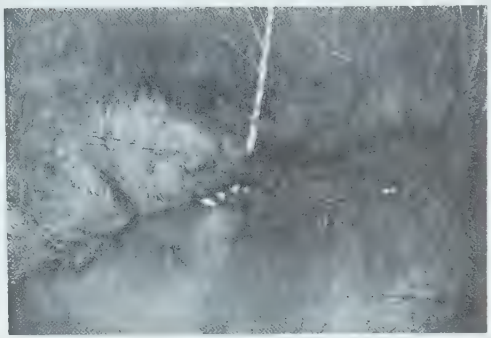
The general description of sand dunes and their management is applicable to Sand Dune Zones in the study area. As this area tends to be more mesophytic, dune succession generally reached climax vegetation as stands of Jackpine. It cannot be over-emphasized that in this area first consideration should be given to the stability of the soil in relation to movement by wind and water.

The recreation value of the active dune area must also be accounted for. There are few active dune sites in the province. Their volatile nature allows for continued rebuilding, even if efforts are made to stabilize them. As such they present a unique feature in the environment. Notwithstanding the recent trend to all-terrain-vehicle use, and the idea that sand dunes are excellent locations for such use, it is strongly recommended that the dune area be restricted from any vehicle use and that no development takes place in that area.

ADDITIONAL RECOMMENDATIONS

Development must be planned within the framework of the special management zones. Care in site selection for roads and campgrounds can lead to more beneficial long-term use of the recreation area. Considerate selection of human occupancy sites will guarantee both recreational use of the area and continued maintenance of wildlife population.

Another impact to park usage could result from forestry practises. The Provincial Parks Policy has been that: "the forests of the parks should be protected and maintained to preserve their natural recreational, scenic and other aesthetic values, and any use made of them should leave them unimpaired for the enjoyment of future generations. Only forest operations which are primarily concerned with the management of the forest for the protection and maintenance of park values should be permitted." Likewise forest operation adjacent to the park in a "Buffer zone" should have certain constraints placed on them. Badly located sawmills or lumber roads (e.g. upper Marten Creek) can cause disturbance both to terrestrial wildlife and, in many cases, the grayling population in downstream portions of the creeks. In addition, the foreground viewing area of a natural wilderness zone could be badly affected by poor logging practices in the surrounding area.



BEAVER ACTIVITY

Water development in the form of channel changes, drainage and pollution must also be controlled. Engineered and constructed channel changes in streams could seriously affect the beaver population, especially in the northern section of the area. Surrounding vegetation and other wildlife habitats could also be altered or destroyed. The drainage of biodegradable waste products resulting from increased human occupancy must not be allowed to filter unchecked into the creeks or lakes of the area.

Pollution from the accumulation of solid wastes can act as a detriment to animal inhabitants. Areas used for the accumulation of garbage are particularly of interest to the bear population and can be areas of conflict between human and wildlife population.

This ring-shaped depression, and another simular to it, are found in the reed marsh just south of the Municipal Park area. No explanation, either geological, biological or archeological has been suggested to explain these features.

ARCHÆOLOGY

INTRODUCTION

The Lesser Slave Lake area situated at the southern edge of the Boreal Forest is potentially a very important area in understanding both Prehistoric Man's adaption to the Boreal Forest environment and the cultural relationships between the Plains and the Northern Forests. Archaeological investigations of the area are superficial at best, and consequently the following evaluation is based on historical, ethnographic and environmental data for the area, and archaeological information obtained from other areas of the Boreal Forest. These data indicate a high potential for archaeological studies of both the Historic Fur Trade and Prehistoric native cultures.

HISTORIC FUR TRADE

Exploration

Lesser Slave Lake is first mentioned in the literature by Sir Alexander MacKenzie while wintering at Fort Fork on the Peace River in 1793. "The Indians (Beaver) informed me, that they had been to hunt at a large lake, called by the Knisteneaux (Cree), the Slave Lake, which derived its name from that of its original inhabitants who were called Slaves. They represented it as a large body of water, and that it lies about one hundred and twenty miles due east from this place. It is well known to the Knisteneaux, who among the inhabitants of the plains on the banks of the Saskatchewan River; for

formerly, when they used to come to make war in this country, they came in their canoes to that lake, and left them there; from thence there is a beaten path all the way to the Fork, or east branch of this river, which was their war-road." (MacKenzie 1801:255).

MacKenzie, however, never visited Lesser Slave Lake and it was not until some five years later that the first white man, David Thompson, arrived on its shores. In April to May of 1799, Thompson travelled from Ft. Augustus, located on the North Saskatchewan River, to the Forks of the Athabasca (Coues 1897:583). During this journey, he visited Lesser Slave Lake. On April 26th Thompson travelled up the Lesser Slave River, reaching the lake on April 28th (Coues 1897:583). However, Thompson returned immediately down river as the ice was still on the Lake (Thompson 1798).

Thompson revisited the lake twice. During November of 1802, he travelled up the Lesser Slave River and crossed the lake to a North West Company post (West Lesser Slave Lake House) which had been erected at the west end (Coues 1897:583, Thompson 1802). Thompson returned the following winter from the Peace River where he was wintering at Fort Fork. In December 1803, he travelled from the Forks to the west end of the lake, visited the North West Company post (East Lesser Slave Lake House) at the east end of the lake. Shortly thereafter he returned to Fort Fork (Coues 1897:583, Thompson 1803).

The Fur Forts (Baergen 1967)

The period 1799-1820 saw the establishment of five fur posts on Lesser Slave Lake. By 1802, the North West Company (NWC) had established posts at both east and west ends of Lesser Slave. East Lesser Slave Lake House was the principle post when visited by Thompson in 1802. Thompson positions it on his map on the south shore of the lake, due south of Dog Island. Thompson in his 1803 journal describes its location as follows: "In the east bay where three brooks fall into the Lake. The house may be about 1/2 or 3/4 miles in from the head of the Lesser Slave River". (Entry for December 17, 1803). West Lesser Slave Lake House is considered to be located on the Hudson Bay Reserve in the town of Grouard (Baergen 1967). In addition to the forts, an abandoned XY Co. post was seen, on the south shore of the lake opposite Shaw's Point, by Thompson during his 1803 journey.

In 1815 the Hudson Bay Company (HBC) erected a post - Forst Waterloo - at the east end of the lake. This post was partially destroyed in December 1816 by a fire set by employees of the NWC. Baergen (1967) states that the original Fort Waterloo was probably located near a small horsehoe lake on the north side of the Lesser Slave, River, just south of a direct line between Dog Island and Muskeg Lake. In 1818, Forst Waterloo was re-established by the HBC at the west end of the lake close by the NWC post.

After the fur resources of the eastern area were depleted, the forts at the west end of the lake became the important posts. The NWC post at the east end was abandoned by 1818. After coalition of the two companies in 1821, Fort Waterloo was abandoned in favour of the NWC post.

The Fur Trade (Baergen 1967)

Lesser Slave Lake District was an important component of the fur trade during the first quarter of the 19th century. Prior to amalgamation of the Companies, the area was the scene of violent conflict as the companies attempted to gain sole control over the fur supply. In addition to such outright acts of hostility as the burning of Fort Waterloo, the Factors were instructed not to lend assistance to each other in time of starvation. Disportionate amounts of liquor was distributed by the posts to the native people

in an attempt to win their trade. When Fort Waterloo was re-established at the West end of the lake, the NWC established a watch tower 50 yards away to observe their activities.

The importance of the area as a main supplier of furs is illustrated by Sir George Simpson who, on more than one occasion, stated that it was the richest part of the whole of Ruperts Land (Baergen 1967). In 1821, for example, out of the total 5,312 beaver pelts procured from the Southern District (40 posts) Lesser Slave provided 1900. Because of its biogeographic location, Lesser Slave also provided the widest variety of furs, a fact remarked on by Simpson and others.

After depletion of the fur resources, Lesser Slave continued to play a role in the fur trade. The Peace River trail used by fur brigades into the northwest, passed through the area and Lesser Slave functioned as an important way station.

ETHNOHISTORICAL AND ETHNOGRAPHICAL CONSIDERATIONS

The Cree are the historical native inhabitants of the Lesser Slave Lake area. While the tribal identity of the group which was displaced by the Cree is not certain (Jenness 1932:383), they were Athabascan speakers, either Beaver, Sarci or possibly Slave. When visited by MacKenzie in 1792-93, the Beaver Indians were living in the Peace River area. Prior to their displacement by the Cree, they lived in the Athabasca Valley. In the Upper Peace the Beaver displaced the Sekani into the Rocky Mountains. The Sarci were also resident at one time in the Upper Athabasca area and the Slave Indians in the Lake Athabasca area. The Cree were permanently resident in the area as early as 1803. By 1819, 199 Cree were living in the vicinity of the new Fort Waterloo (Baergen 1967). Beaver occasionally visited the fort. Freeman (Metis) were quite common in the area by 1820.

Since the Beaver are considered the most likely occupants of the Lesser Slave area in prehistoric times, one may briefly consider their basic cultural adaption (Jenness 1932, Goddard 1916) to the Boreal Forest environment. In the Peace River area, the Beaver subsisted primarily by the individual and group hunting of bison, moose, cariboo, deer and elk. Moose were the prime subsistance resource over much of their territory. Small mammals, principally beaver and rabbit, were taken. Historically, fishing was considered to be a secondary activity, only undertaken in times of need since the primary fish producing lakes were located east and south of the Peace River in Cree Territory. (Goddard 1916:216). It is quite probable that prior to the displacement from the Athabasca River, fishing was considerably more important to the Beaver.

The Beaver, who numbered 1500 in 1790 (Jenness 1933:384), were divided into a number of independent bands each with its own separate hunting territory. Their settlement pattern in the Athabasca Drainage is not known, but one may conjecture that late summer-early fall fishing camps located at the outlets/inlets of the rivers and streams was a major component of the seasonal round. These activities would involve the cooperative effort of a number of bands. Winter settlements probably consisted of small hunting camps located adjacent to favourable winter bison and moose habitats.

PREHISTORIC RESOURCE POTENTIAL

The nature and extent of the food resources of the Lesser Slave Lake area would determine the basic subsistance orientations and settlement patterns of the prehistoric human population resident in the area.

In 1800-1820 the area contained a wide variety and abundance of exploitable ungulates; wood bison, moose, elk, and deer (2 species)(Thompson Manuscript Journals

1798-1803). Thompson commented on the surprising abundance of bison and moose both at the east (April 1798) and west end (December 1803) of the lake and on the south shore (December 1803). Fish (whitefish, pickeral and pike) were abundant and extensively used by the occupants of the posts. Thompson (April 1798) also remarked on the great quantities of waterfowl (geese, swan, ducks) and the many beaver houses in the marshes at the east end of the lake. As noted earlier, fur bearers were particularly abundant. For example, the 1821 record for Lesser Slave Lake District records 41 black bear, 9 brown bear, 3 grizzlies, 5335 beaver, 13 cats, 6 elk, 15 fisher, 5 silver fox, 11 cross fox, 11 red fox, 2 goats, 2813 martin, 46 mink, 234 muskrat, 124 otter, 261 swans, 19 wolves, 50 wolverines and 328 moose; furs and hides shipped from the District for that year. (Baergen 1967)

The historical records clearly indicate that the Lesser Slave areas supported a large, diversified terrestial and aquatic biomass which could be exploited by prehistoric populations. Further, this biomass was larger and more diversified than that to be found in the forests further north. This, one may hypothesize, would result in a higher human carrying capacity for the Lesser Slave Lake area and, therefore, potentially larger prehistoric populations.

PREHISTORY

Prehistoric archaeological research in the Lesser Slave Lake area consists of three superficial archaeological surveys. In 1964, J.V. Wright, National Museum of Man, Ottawa, recorded four sites in the area while travelling north to Great Slave Lake.

GiPq-1: Located in the Lesser Slave Lake Provincial Park, North Shore Campground.
GiPs-1: Located on the west edge of the town of Wagner, just above the junction of a creek with Lesser Slave Lake.
GiPs-2: Located on the east bank of Canyon Creek at junction of it with Lesser Slave Lake.
GjPa-1: Located in the town of Grouard on the edge of Lesser Slave Lake, east of the Highway Bridge.

Archaeologists from the University of Alberta have recorded a site at Shaw Point. A crew from the Provincial Museum & Archives spent part of a day in the area in 1971; no sites were recorded. While the general opinion of the archaeologists from the Alberta institutions is negative, Wright (personal communication) an expert on Boreal Forest Archaeology, feels that the area has considerable potential and should contain a large number of sites. The results of Wright's brief survey, done during part of one day, lends credence to his opinion.

One may also evaluate the archaeological potential of the Lesser Slave area by comparing it to other areas of the Boreal Forest where more intensive archaeological research has been undertaken. In the Calling Lake area, excavations have been carried out at two sites (Gruhn 1966, 1967, 1968). These sites, situated on an old lake beach three meters above the lake, produced a variety of cultural materials and faunal remains. The associated artifacts indicate an occupational history of 5000-6000 years for these sites. The other area which has been investigated is Fisherman Lake in the NWT. Here intensive research since 1965 has uncovered a long sequence of 10,000 to 12,000 years of human occupation from a number of archaeological sites (Millar 1968, Federichuk 1970). At Fisherman and Calling lakes a dual prehistoric subsistance based on moose and fish in characteristic.

Since well documented sequences of human occupation have been excavated from these areas it is reasonable to assume that a similar sequence should be obtainable for the Lesser Slave Lake area. Further, the exploitable biomass of Lesser Slave is larger and more diversified that these areas and there should therefore be a

larger prehistoric population and therefore more archaeological sites around Lesser Slave.

The geographic position of Lesser Slave - situated on the historic route between the Plains and the Northern Boreal Forest - makes it potentially an important area in understanding the relationships between the prehistoric cultures of these two life zones. These relationships are very poorly understood at this time.

The Lesser Slave Lake Provincial Park - Specific Evaluation

The Lesser Slave Lake Provincial Park and immediately adjacent area is geographically situated such that it potentially contains a large number of archaeological sites.

(1) Historically the east end of the lake was the first to be settled by the fur traders. According to Thompson's map and description, East Lesser Slave Lake House was situated on the south side of the Lesser Slave River. It is known to have been largely destroyed by construction of the airport at the town of Lesser Slave Lake (Arnold 1971). The original Fort Waterloo is located on the north side of the river, and is within the proposed extended boundaries of the Provincial Park. If the location data is accurate, it would be relatively easy to find. In addition, there should be a number of Metis cabin sites in the area.

(2) Prehistorically the area holds considerable potential for containing a number of archaeological sites:

a.) The adjacent river and lake would present excellent opportunities for exploiting fish resources.
b.) The large expanse of marshland which, historically contained large quantities of waterfowl, fur bearers and moose, would present a highly concentrated biomass for exploitation by prehistoric populations.
c.) The open aspects of the forest in the area should have supported in addition to other ungulates a relatively high population of wood bison.

Because of these factors, one should expect to find a large number of archaeological sites relating to the usage of these biotic resources in the Lesser Slave Lake Provincial Park area. Some of these sites would be relatively large in size, since the area would be one in which prehistoric groups would concentrate their activities during certain seasons of the year. As a major area of prehistoric activity one would expect a long history of human occupation to be contained within these sites.

One may predict that sites will concentrate around the Lesser Slave River exit, eastwards along the east shore, at the mouths of the various creek - Lily, Marten Creek and possibly Muskeg Creek. Areas of high topographic relief are also used prehistorically for lookouts or ceremonial purposes and one may predict a site(s) on top of Marten Mountain.

ARCHAEOLOGICAL INVENTORY AND EVALUATION

In order to evaluate the proposition set forth in the preceding sections an archaeological inventory will initially be required. Such an inventory would locate and evaluate archaeological sites in the Provincial Park, in order that any significant sites can be reserved for preservation and/or development. The inventory should include areas adjacent to the park, to provide a comparative data base for evaluating sites within the Park.

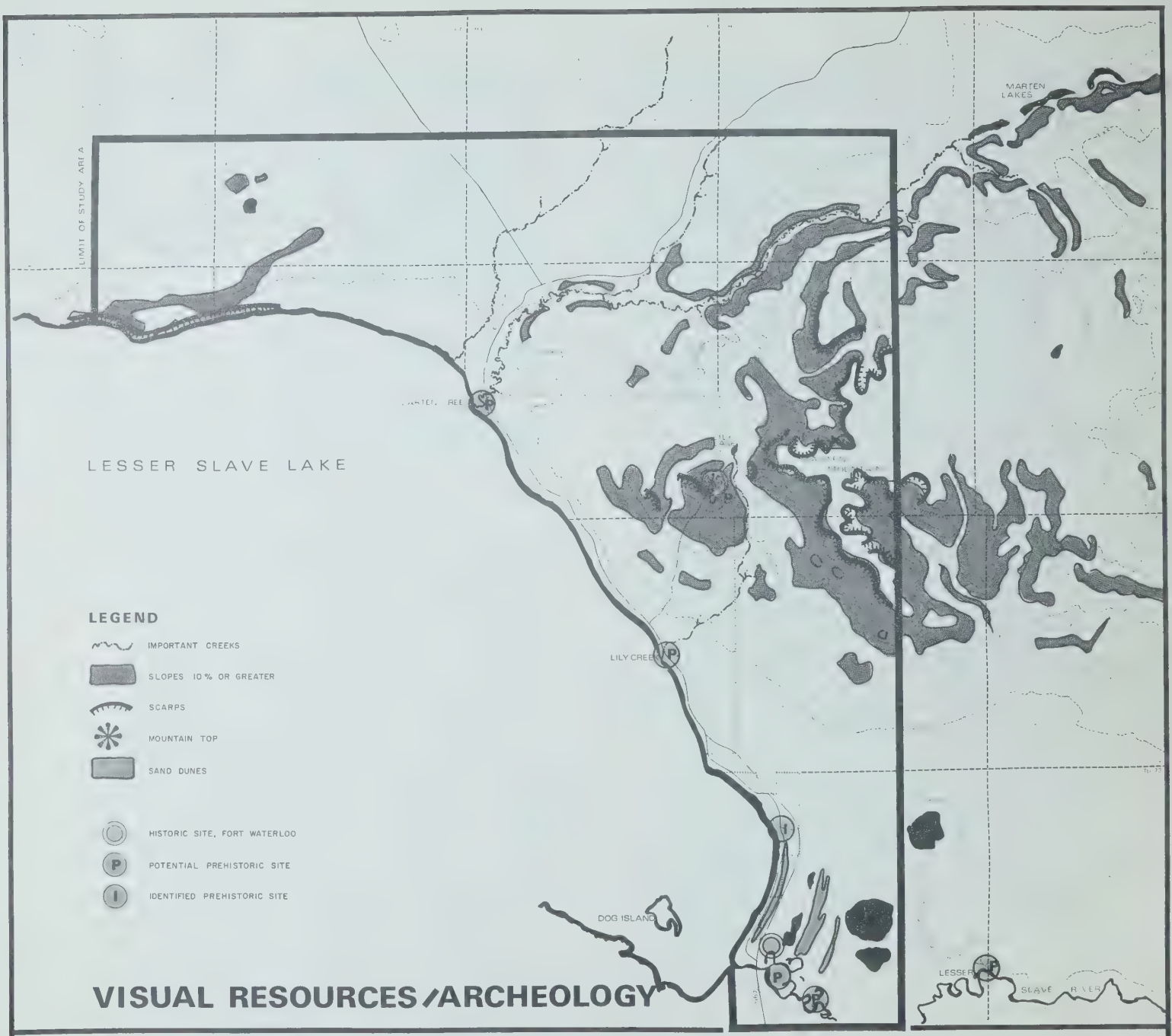
INTERPRETIVE POTENTIAL

The development of the interpretive aspects of the archaeological resources of the Lesser Slave Lake Provincial Park could provide a significant input into the

Park Interpretation. The interpretation could center both on the Historic Fur Trade and the Prehistoric cultures. As has been outlined earlier Lesser Slave was an important area in the fur trade era and because of this fact a high potential exists for developing an interpretation of the Fur Trade in the Boreal Forest. One of the forts may be located in the Provincial Park and could be developed for onsite interpretation. Further, since the local ecology is relatively intact compared to many other areas of Alberta first settled in the fur trade era, it would be possible to develop a particularly informative interpretive plan which could be directly integrated into a natural history program.

The concept of an integrated interpretive program of the archaeology and the natural history of the Park could also be extended to the prehistoric archaeology by development of the prehistoric sites through excavation and data analysis. These results could be used to develop an interpretive plan which could provide an integrated interpretation of the ecocultural systems of the area, as it was both during the fur trade and in prehistoric times. This could be made particularly meaningful if paleo-environmental data on the fluctuations of the biotic and abiotic components of the ecosystem were obtained for integration with the archaeological data. The Lesser Slave area, given its geographical position, its human history - both documented and potential, provides a unique opportunity to develop in Alberta such a plan, as it's most readily accessible areas are archaeologically and environmentally not badly disturbed.

Interpretive plans of this type which integrate man and nature are particularly useful in interpreting the present day ecology of a reserved area. Further, archaeological or historical interpretations are very highly utilized by the visiting public. For example, the small interpretive site at Rocky Mountain House, developed by the National Historic Sites Service, had a registered visitation of 20,000 people in 1971. A recent survey (Summer 1971) made by the Government of Saskatchewan, of travellers on the Trans Canada Highway, indicated that 80% of those families interviewed, were primarily interested in visiting historical and prehistoric sites, museums, and National Parks, primarily for aesthetic and educational benefits rather than recreational purposes.



MASTER PLAN STUDY

LESSER SLAVE LAKE PROVINCIAL PARK

ALBERTA DEPARTMENT OF LANDS AND FORESTS · PROVINCIAL PARKS DIVISION

LOMBARD NORTH PLANNING LTD. WINNIPEG · CALGARY · VANCOUVER APRIL 1972

NORTH

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VISUAL RESOURCES

From a regional viewpoint the study area is divided into three units of visual identity: the flat reflective plane of the lake, the flat poorly drained lacustrine valley and the highlands containing Marten Mountain and Sawridge Hill.

From a closer viewpoint the visual units become far more complex and can be enumerated as follows:

1. the lake and lake edge
2. the foreshore
   a. sand
   b. gravel
   c. Mixed sand, gravel and cobble

3. River and creek mouths
4. Rivers and creeks
5. Lakes & sloughs
6. Wet lands
   a. sedge-willow-alder marsh
   b. Tamarack muskeg
   c. Black spruce muskeg
   d. hillside springs
7. Sand dunes & abandoned beach
   a. active
   b. stable
8. Aspen woodlands
9. White spruce forests
10. Pine forests
11. Slopes
12. Escarpments & exposed bedrock
13. Farmhouse, barn & fencing
14. Roads & Highways
15. Easements & clearing
16. Borrow pits
17. Birds
18. Animals
19. Fish

In addition to these, it must be kept in mind that the most memorable scenery is often found where several of these units are combined or juxtiposed, for example:

1. lake, beach, dunes & reed marsh
2. Pine ridge, slope, reed marsh and tamarack muskeg
3. Aspen woodland, meadow whitetail deer and stream course.
4. Pine ridge, sand dune and borrow pit.
5. Aspen woodland, willow muskeg and moose.

Also, the importance of protecting visual resources depends upon the relative position of the viewer, for example:

1. The viewer along the beach or in the lowlands is not aware of clearing in the forest or on top of Marten Mountain. However, he can clearly see the mountain slope and clearing on the slopes facing him would be quite apparent.
2. The view from Marten Mountain fire station reveals some of the cleared areas in lower forests but may not include many of the slopes.

Since many of the views and visual impressions of the park will be gathered from the automobile, it is essential that the view from the road be carefully considered. All roads in the park should be considered scenic resources and developed as such.

Finally, many of the most memorable images are of transient things, large & small. Some examples:

1. A thunderstorm
2. Children playing at the beach
3. Wave patterns in the sand
4. The flight of a butterfly in summer.
5. Aspen and dogwood in the fall
6. Bear footprints in the snow
7. Domes and blowholes in the lake-shore ice.
8. A flight of geese returning in the spring.

ICE "VOLCANOES" ALONG THE SHORE

Perhaps we would be wiser to consider "sensory resources" rather than strictly "visual resources". For example:

1. the cry of the loon in summer and the wolf in winter.
2. the smell of muskeg and marsh
3. the wind in the pines and the truck on the highway.
4. the sound of voices and the sound of silence.

The Study area is very rich in all of these resources -- both pleasand and obtrusive. It should be our goal to direct all activities in the parks towards maximizing the enjoyable and rewarding experiences and impressions and minimizing distractive and inappropriate activities and uses. This can be achieved in part by:

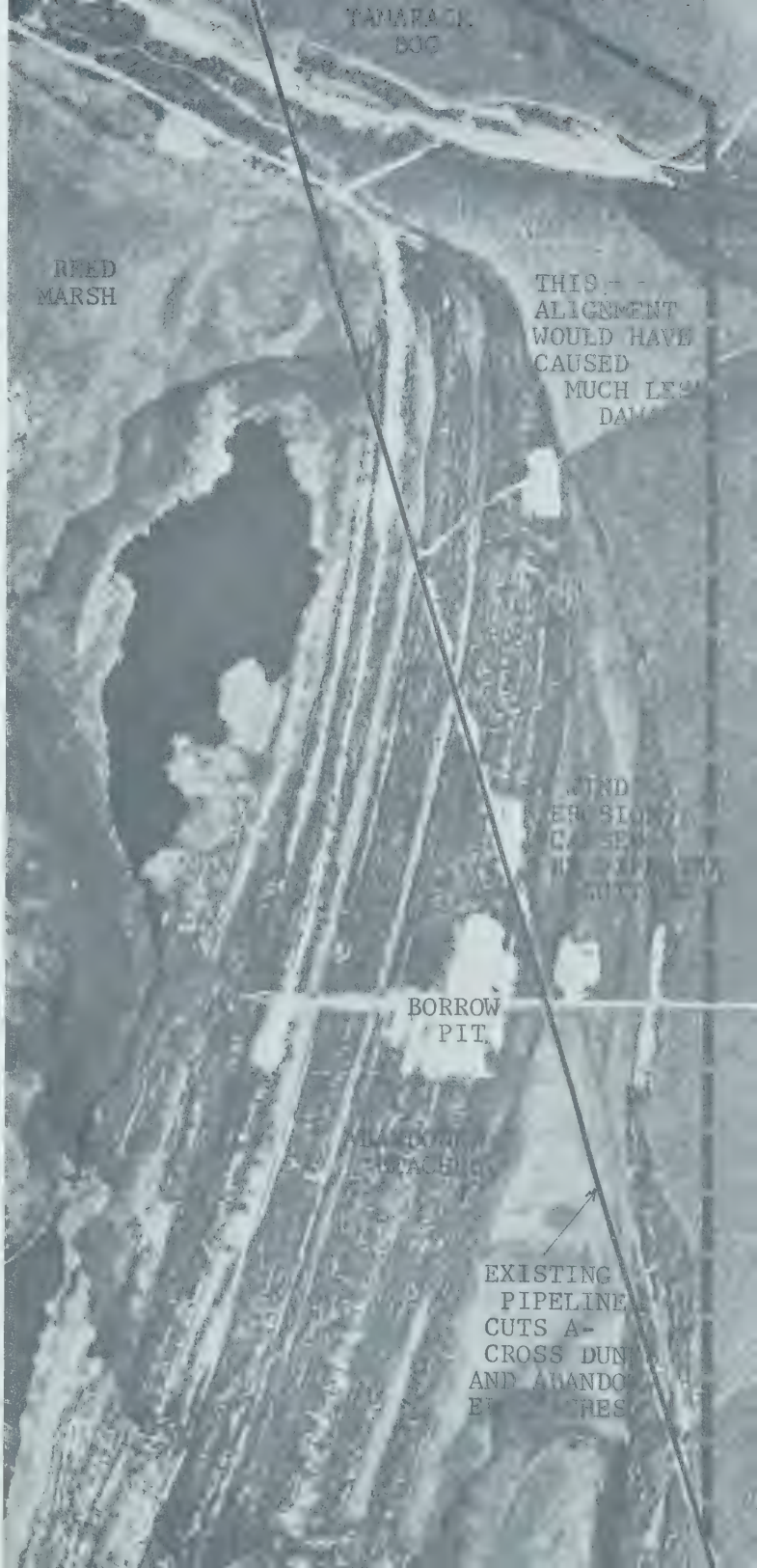
1. Preventing over-development
   a. roads
   b. campsites
   c. facilities-oriented recreation
2. Preventing destruction of amenities
   a. over use
   b. abuse
   c. missuse
3. Concentrating on enjoyable interpretive and education programs in the visiting public:
   a. a broader understanding of the area.
   b. a deeper understanding of our ecosystems.
   c. an increased enjoyment.
   d. a concern for preservation of scenic values.

EXISTING LAND USE

PETROLEUM INDUSTRY

The exploration and extraction of natural gas has been an important industry in and around the study area for many years. As a result, there is very little area within existing park boundaries that is not within 1/2 mile of a well, test well, well access road, pipeline or power easement. It is remarkable that these installations are not as obvious as their numbers would indicate.

These are, however, instances where a considerable amount of unnecessary environmental damage has been done by the petroleum industry; the most obvious examples being pipelines cut diagonally across ancient sand beaches in the southeastern portion of the study area. These pipelines have exposed the sand to aeolial erosion and blighted a very scenic area. As the accompanying illustration shows, such destruction could easily have been avoided.



On the positive side, petroleum industry construction, although a rude intrusion into natural park lands, has provided access to many areas of recreational value. Also, well clearings and cleared easements provide open grazing and foraging areas for wildlife adjacent to cover.

FOREST INDUSTRY

The forest industry has apparently been active to the north of the study area and it is understood that timber claims have been established on the southern face of Marten Mountain. There has, as yet, been no sign of active cutting in the area.

AGRICULTURE

Agricultural development in the areas appears to be limited to hay cutting in the reed marsh area east of the sand dunes and ranching on a section owned by Mr. & Mrs. Eben Ebenau. In terms of visual impact, the ranching is quite acceptable and functions as a pleasantly appropriate contrast to forest.

Parks naturalists should study the reed marsh area to determine if haying adversely affects waterfowl habitats.

RECREATION

The existing private recreation developments in the area are limited to the municipal or Regional Park being developed by the town of Slave Lake. In their present condition, they leave much to be desired. The development consists of an auto racing oval, improvised grandstand, privies, and a broken down sign. Future developments planned for this area will be discussed later, but clearly these must be of a higher standard if they are to attract tourists and improve the local image.

Lesser Slave Lake Provincial Park Campgrounds include the North Shore, Lily Creek and Marten Creek facilities. All appear to be inadequate to meet current demand and were obviously never intended to do so. As a rule, shelters and campgrounds have been located on sand dune areas of high user demand but very low user carrying capacity with little or no attempt to control or regulate automobile or foot traffic. All show obvious signs of deterioration and over use, pointing to the need for planning before initial development.

Recommendations of the future use of these areas will follow later in this report.

LILY CREEK CAMPGROUND - Note destruction of bark and erosion of sand

HIGHWAYS

The principle road through the area is Highway 967 connecting Slave Lake to Utikuma and Wabasca. Presently the road is well used by traffic from the petroleum and forest industries with some peaking of tourists during summer months. According to Department of Highways forecasts, forest industry and recreation will make up an increasingly larger portion of total traffic in the future.

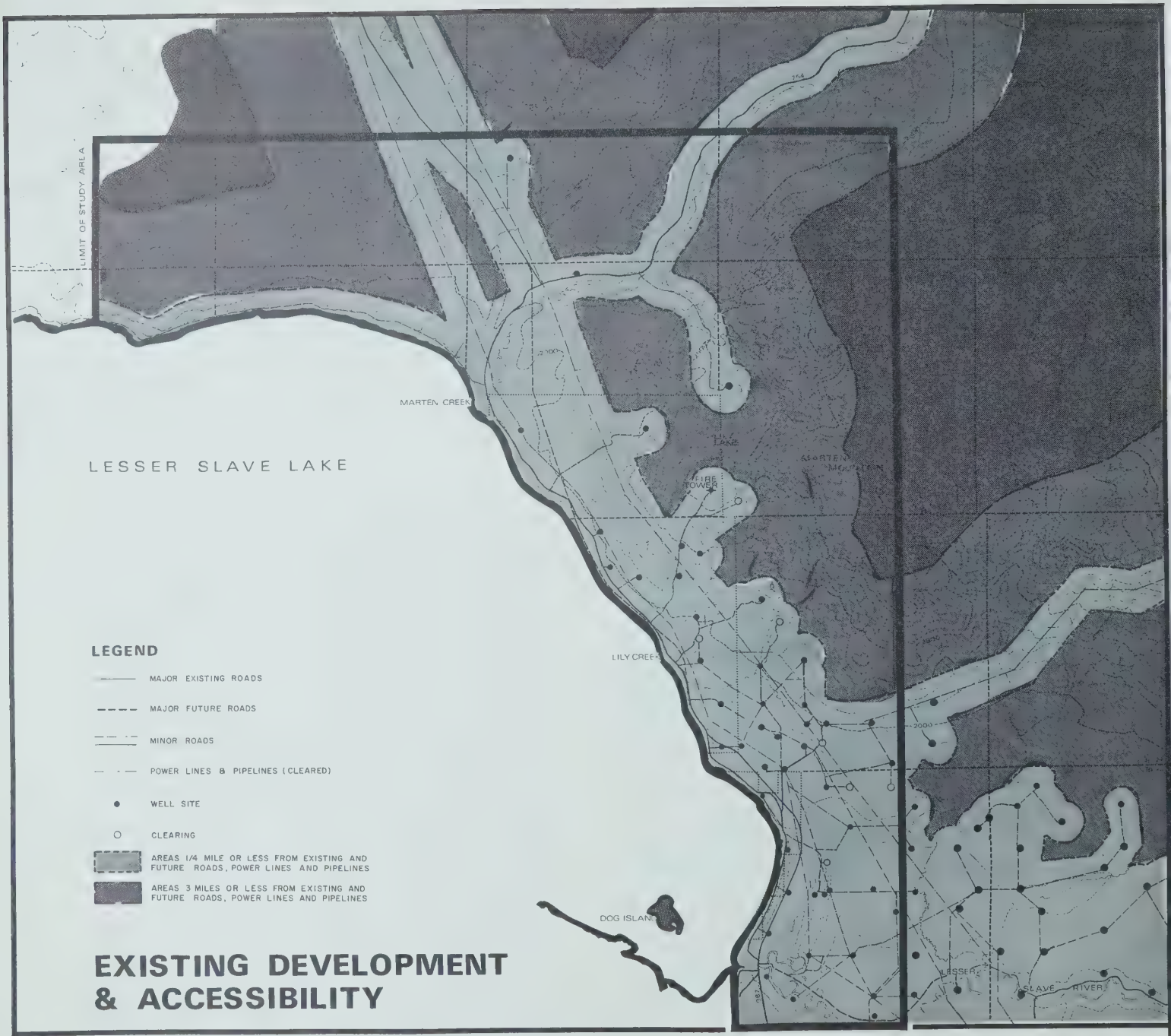
Work was completed this winter on the first phase of upgrading the existing highway extending from the town of Slave Lake to north of the Eban Ebenau property, a distance of slightly under 10 miles. This new construction is characterized by uniform clearing of a 200' right of way and rigidly graded sideslopes. The total visual effect of this operation upon the forested landscape is devastating. Scenic and biological values -- the resource of which parks are built -- appear to have been ignored under the misconception that..." a northern road is a northern road..." whether or not it transects a provincial park and contributes, for better or worse, to the enjoyment and benefit of the park users that will make up a fair part of summer traffic.

Borrow pit in a stabilized sand dune. Such areas will be very difficult to stabilize.

A large blown down tree - the result of highway clearing.

Another area of major criticism can be attributed to the destruction of stabilized sand dunes for use as road fill. These significant natural features are unique in Alberta and are essentially the reason for the park's formation. They are among the main tourist attractions of the area, without which recreation based industry would be seriously jeopardized.

It is not the purpose of this section to decry past errors but to use them where appropriate to illustrate the paramount importance of understanding all of the resources of the area so that one is not developed in a way that impairs other equally important resources.



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III. ANALYSIS

III. ANALYSIS

With the information from the study area inventoried it is now possible to interrelate and interpret these factors and establish constraints and opportunities for use.

CARRYING CAPACITY FOR RECREATIONAL USE

Prior to development, it is essential to understand the limits to which a given ecological unit can be used for a specified purpose and intensity of use without either immediate or long term deterioration. This measure of durability is called CARRYING CAPACITY.

In arriving at an evaluation of carrying capacity for recreational use in the study area it was necessary to overlay surficial geological, hydrological, topographical and biological inventories to form a composite of, in this case, four dimensions. By identifying sites at which the most resistant areas of each dimension over lap on the composite, it was possible to map areas of greatest carrying capacity. Areas of less capacity were similarly identified. The Carrying Capacity Map identifies units within the study area in terms of tolerance to recreational use.

It should be noted that in addition to carrying capacity, there has been a factor for recreation development "suitability" included in the above classifications. For example, although white spruce dominated mixedwood will tolerate fairly intensive use, these areas are not as suitable for extensive development because of less sunlight penetration, poorly developed understory and longer duration of snow cover. Therefore, these areas have been included in Class II. Also included in this classifications are areas of higher elevation with pine forests which, while common in the Province, are quite unusual locally in that they represent residual forest cover dating into preglacial times. These areas of Cordilleran Transition were discussed earlier in this report under the subject of Biotic Communities.

CLASS I - HIGH USE CAPACITY

1. Lesser Slave Lake - water resources
2. Present beach foreshore
3. Gravel abandoned beaches
4. Glacial till and thin glaciolacustrine clay over till in areas of Aspen dominated mixedwoods.
5. Large mammals; whitetail and mule deer.

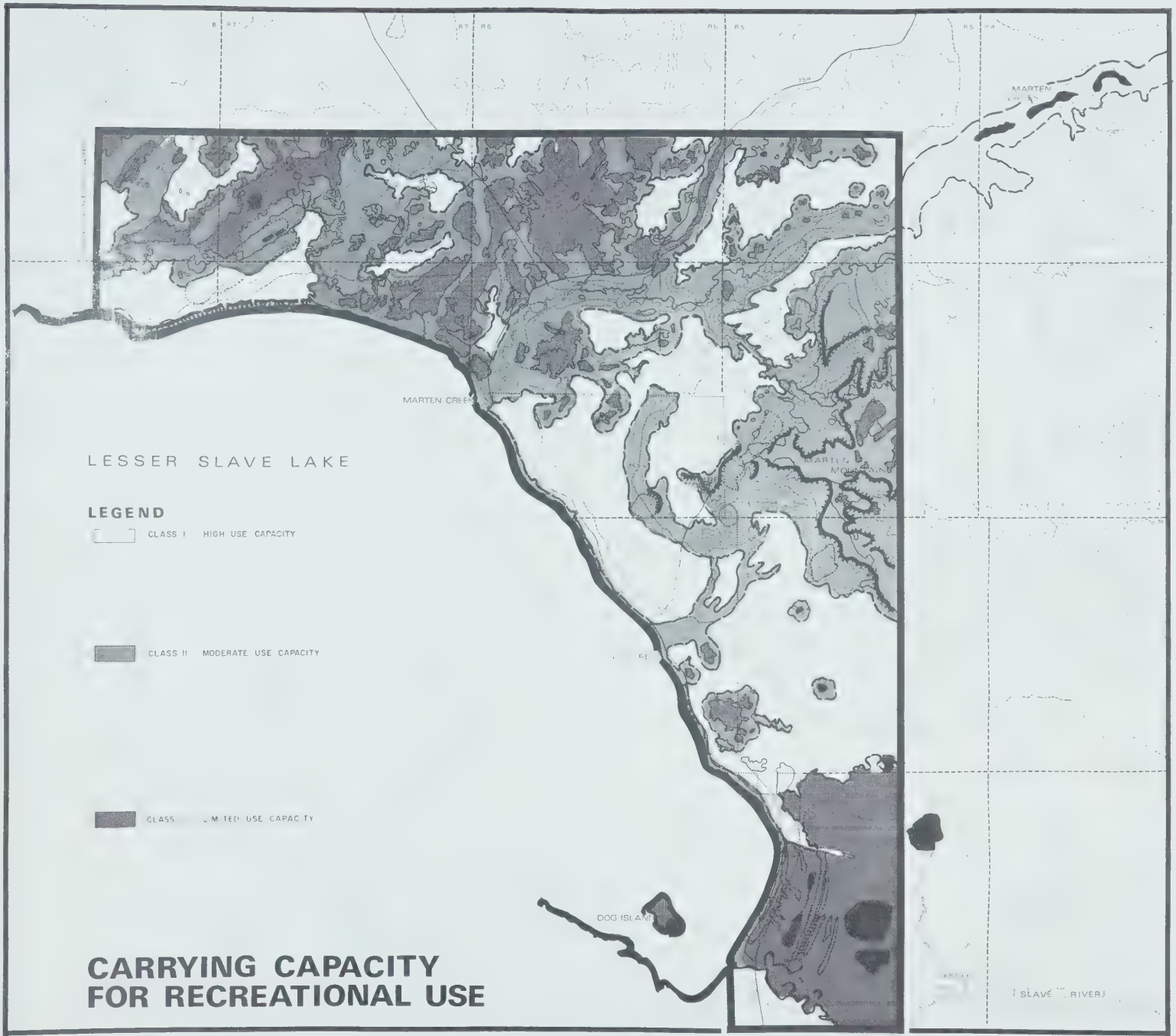
CLASS II - MODERATE USE CAPACITY

1. Lesser Slave Lake; fisheries resource
2. Aquifers and areas of springs
3. Slumps, steep slopes and escarpments
4. Major creek & stream corridors
5. Margins of muskeg areas
6. White Spruce dominated mixedwoods
7. Cordilleran transition (Jackpine & Lodgepole pine)
8. Old and Recent burns
9. Large mammals; moose, deer, black bear

CLASS III - LOW USE CAPACITY

1. Marten Lakes, Marten Creek, Lily Lake, Lily Creek.
2. Glaciolustrine clay overlying shale -- Black spruce and larch muskeg; reed & sedge marshes.
3. Active and stabilized sand dunes and sand abandoned beaches -- pine sand dune communities.
4. large mammals & carnivores; woodland caribou, wolf, lynx, grizzly bear.

Because of the fragile nature of Class III areas, buffer zones of approximately one quarter mile width surrounding such areas have been placed in Class II.



CARRYING CAPACITY FOR RECREATIONAL USE

MASTER PLAN STUDY

LESSER SLAVE LAKE PROVINCIAL PARK

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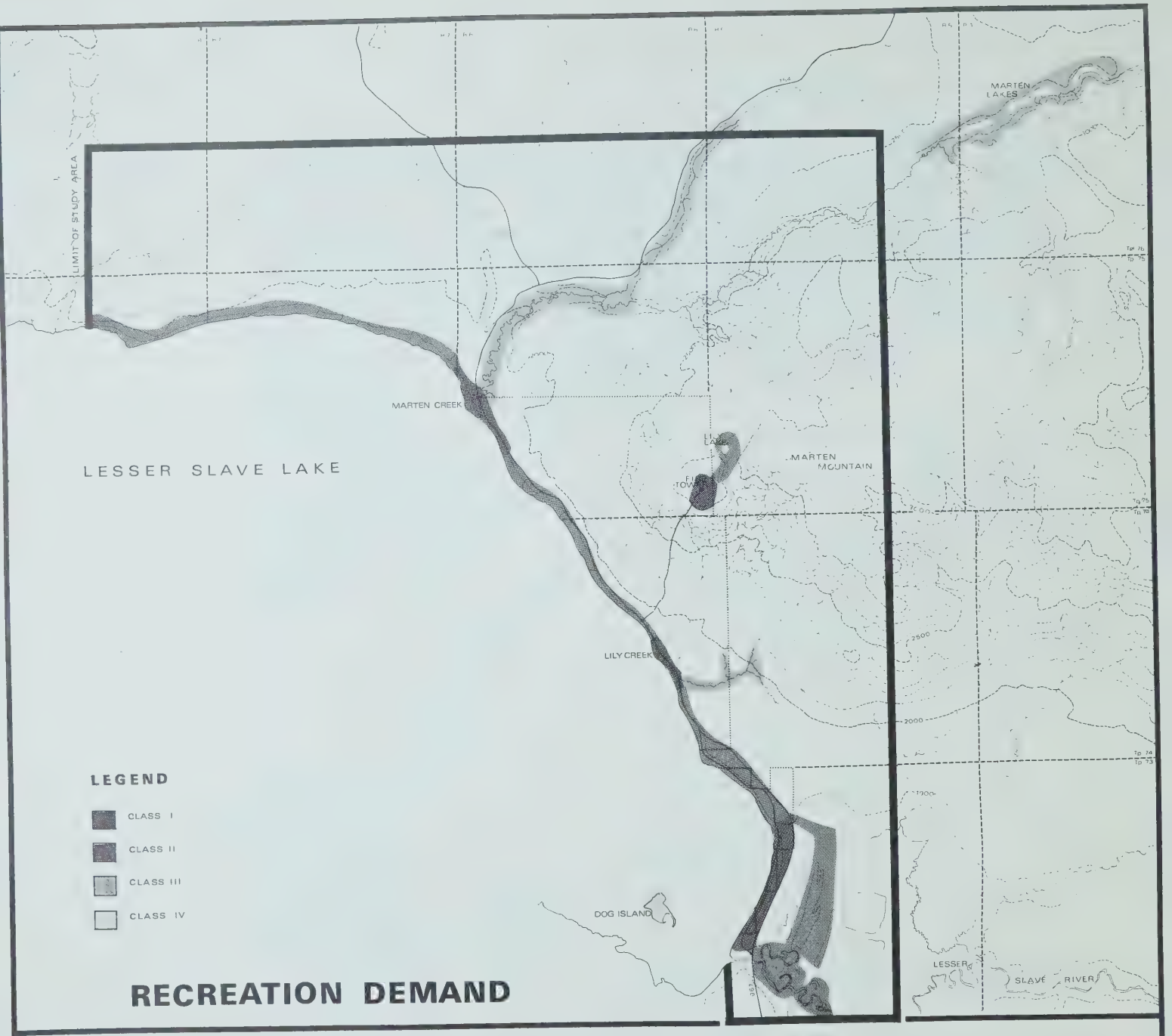
NORTH

1 MILE



RECREATION DEMAND

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NORTH

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AREAS OF RECREATION DEMAND

In evaluating recreation demand, it was necessary to aggregate factors discussed under Visual Resources with factors of existing development and access. The following listing indicates areas within the study in approximate order of visitor preference.

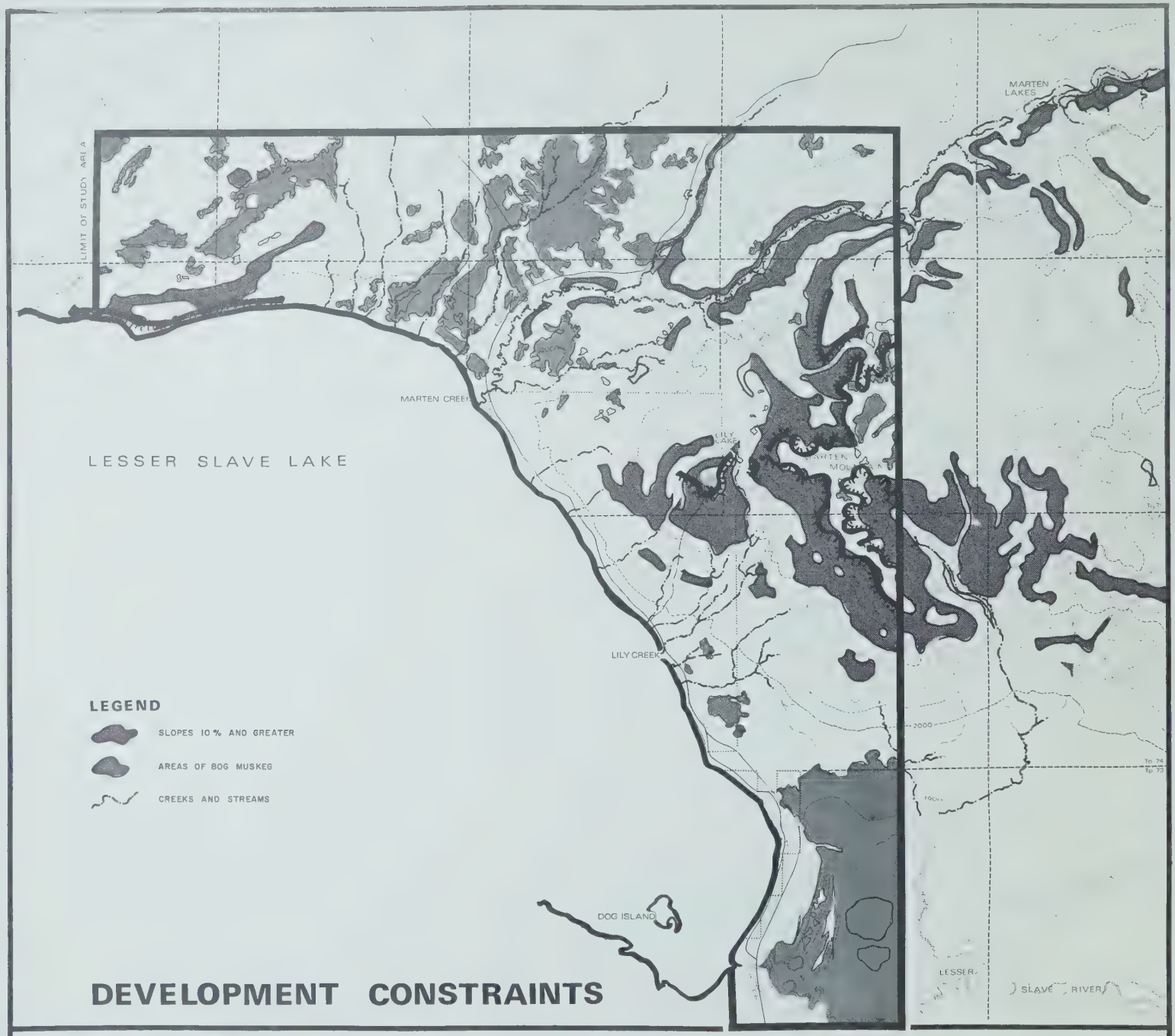
Class I - High Relative Recreation Demand
1. Sand beaches and shore dunes
2. River mouths
3. Scenic overlooks (Marten Mountain)

Class II - Moderate Relative Recreation Demand
1. mixed cobble & sand beaches
2. gravel beaches
3. Aspen mixedwood near shore
4. streamside zones
5. Lily Lake (if trail developed from fire tower)
6. Abandoned beaches and adjacent reed/sedge marsh
7. Marten Lakes (if trail developed from Wabasca Highway)
8. Hillside grades & springs
9. Escarpments and margins of muskeg

Class III - Low Relative Recreation Demand
1. Interior aspen mixedwood
2. Interior coniferous woods

Class IV - Very low Relative Recreation Demand
1. Black spruce muskeg
2. Larch muskeg

The study area is well supplied with roads and clearings, as shown on the map of Existing Developments. All of the high recreation demand areas described above are reasonably accessible from existing roads.



DEVELOPMENT CONSTRAINTS

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NORTH

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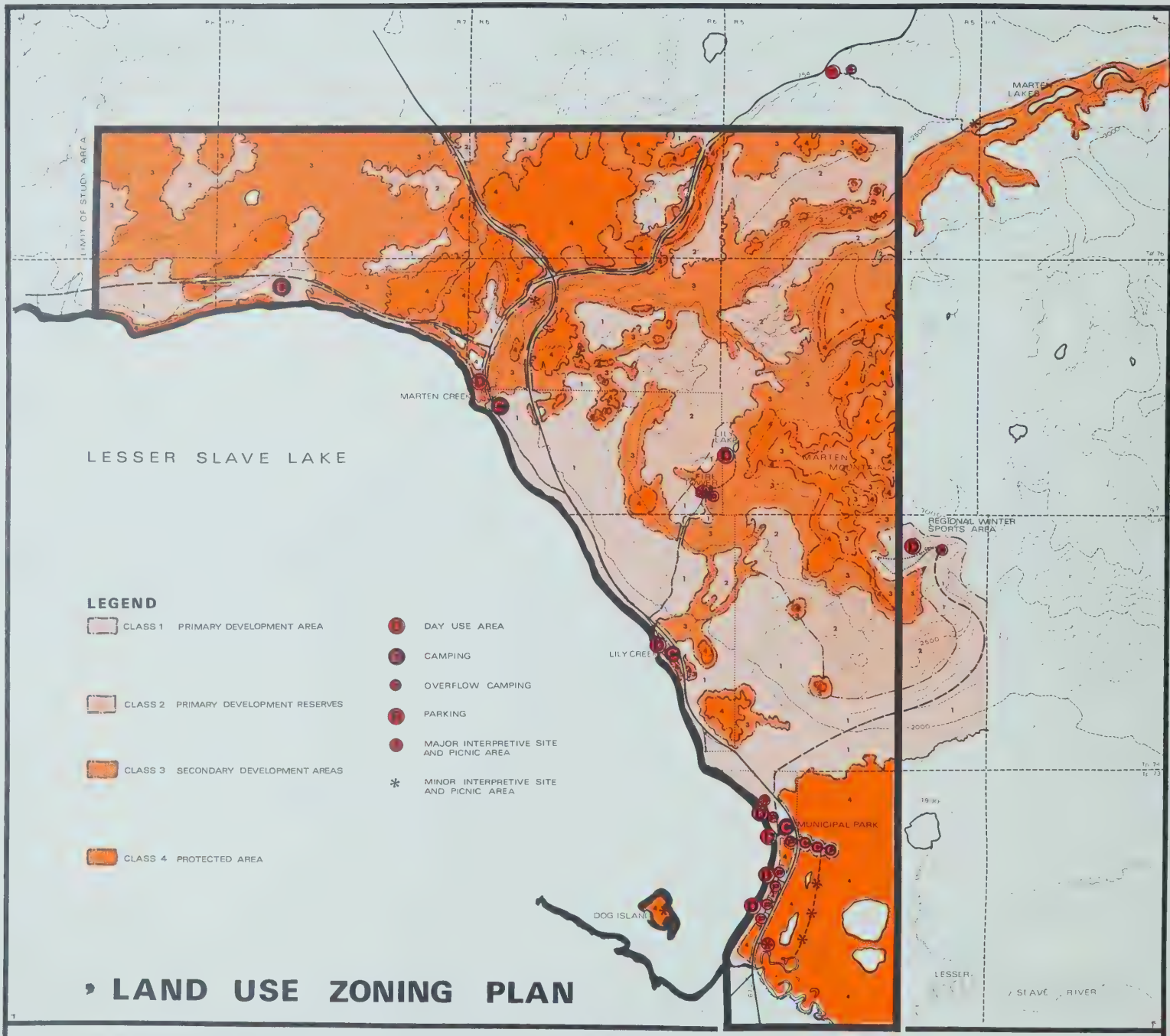
IV. PLANNING RECOMMENDATIONS



LAND USE ZONING PLAN

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NORTH

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IV. PLANNING RECOMMENDATIONS

ZONING

The zoning areas proposed on the accompanying map closely follow the outline of the carrying capacity study. Although zoning must always be a compromise between user demand and existing amenities, it is wiser to place some restrictions on use rather than to over tax carrying capacity. As the map shows, the zones are based upon physiographic and biological factors and therefore the typical gridiron zoning patterns of urban areas are not seen here.

ZONE I - PRIMARY DEVELOPMENT AREA

Areas suitable for roads, parking, campgrounds, day use and interpretive centres. These areas have good accessibility, high carrying capacity. Since much of this land also serves as winter range for deer and moose, it should be developed so as to preserve this characteristic.

ZONE II - PRIMARY DEVELOPMENT RESERVES

These areas are similar to Zone 1 but are not accessible to existing roads or major tourist attractions. Some of these areas could be developed in the future if sufficient demand warranted, but in these areas are found important summer range for deer and moose which should remain as unrestricted as possible. It is fortunate that the principal occupants of this land, the two species of deer, are relatively tolerant to close human occupation.

ZONE III - SECONDARY DEVELOPMENT AREAS

Areas in this zone are suitable for such impermanent uses as picnic areas, walk-in tent sites, interpretive trails and hiking and riding trails. Zone III land may also serve as a buffer to Zone IV land.

Zone III land includes major creek corridors, aquifers and belts of hillside springs which, in addition to their important hydrological functions, often serve as local migration routes and winter range for large mammals. The majority of moose noted,during the winter large mammal survey,were found in these creek corridors.

ZONE IV - PROTECTED AREAS

These are fragile areas to be protected from over use by isolation or, where necessary by special facilities such as boardwalks, paved pathways and fencing. Included in this zone are sand dunes, marsh and muskeg, and recent burns. Woodland caribou require the larch fens and adjacent spruce woods while moose forage on the willow brush on the margins of muskeg and marsh and beaver, muskrat and various smaller mammals, and birds require these wetland habitats. The moose, deer and bear benefit from recent burns.

It is noteworthy that the moose and caribou, together with their principle predator, the wolf, are very intolerant of close human occupation and it is fortunate that they inhabit areas not otherwise suited for development.

GENERAL STANDARDS

The principle attractions of the Lesser Slave Lake area are those combinations of sensory stimuli that spell wild nature -- the many distinct yet interrelated forms which the northland takes in response to glaciers, lake forces, climate and natural occupancy by plants and animals. These are the things technical man cannot duplicate, the things that present and future generations of urbanities seek -- consciously or unconsciously -- when traveling to the parklands.

It is true that visitors also seek accustomed comfort and convenience but these factors, isolated from the attractions of nature, would attract no one. Add to this the considerable problems and expenses associated with servicing recreation sites dispersed through the study area and it is clear that extensive facility oriented campground and recreation development is not appropriate within this park. In other words, development should be "primative" by park standards. Such facilities as hot water showers, launderies, stores, cabins, motels, etc. can and should be supplied by the community of Slave Lake either in the townsite or in the Municipal Park being developed near the North Shore Campground. This would also serve to maximize tourist industry income potential for the town.

DESIGN GUIDELINES

In keeping with the concept that natural ammenities are the essential attractions, it is strongly recommended that such facilities as are necessary, such as picnic shelters, change houses, sanitary facilities, boardwalks, stairways and campground furnishings, must become background elements and not call attention to themselves. This is often very tempting to design such structures in isolation -- as they appear on a blueprint -- and to attempt to make each architecturally significant. It would be better if the designer undertook to make such structures essentially invisible, yet sensibly convenient. One could learn from primative dwellings of the area which contain no non-essential features, yet are superbly appropriate to their function and setting. This essential economy is the essence of such design.

POWER-ASSISTED RECREATION

It is strongly recommended that no power-assisted recreation be allowed within the park other than scenic driving on established roads. The extremely fragile sand dune area is very attractive to 4-wheel drive, motorcycle, dune buggy, A.T.V., and snowmobile enthusiast. Yet if such recreations are allowed these areas would soon resemble nothing more than borrow pits. In addition, the noise and activity would drive off many other park visitors as well as animal inhabitants. Needless to say, the consultants agree with the Parks policy excluding use of overterrain vehicles in Provincial Parks.

BOATING

The above-mentioned concern regarding noise applies also to power boats, but in this case there is a greater cause of concern -- the unpredictable nature of the lake surface. As described earlier, strong winds are reportedly quite capable of raising 3-4 foot waves on short notice and 10' waves are not unknown. In his report on recreation potentials, W.M. Baker (October, 1971) states that although these conditions do not exclude boating, they do limit boating potential, especially for enthusiasts unaccustomed to rough water. For these reasons, development of boat launching facilities within the park are not recommended. This does not mean that private development of facilities outside the park is unwarranted, though it does not seem these facilities would be either elaborate or extensive. It appears that the upper parts of Lesser Slave River have the greatest potential for marine use, though the river mouth tends to develop sand bars which may be an intermitant problem to larger craft. No other natural harbors occur within the study area, and, given the problems discussed, artificial harbor development appears quite unwise.

Canoeing along the shoreline and on Marten Creek and Lesser Slave River should be encouraged. A small private canoe rental concession in the townsite should facilitate this use. In addition, limited picnic facilities on Dog Island could cater to canoests, since this passage should not be too hazardous if common sense rules.

LILY CREEK SHELTER - Note location atop sand storm beach and destruction of ground cover by overuse.

VISITOR FACILITIES

In addition to what has been said about appropriate character and quality of development, some discussion of specific use is in order.

1.) Day Use Areas should occupy locations of highest tourist demand -- such as sand beaches and the Marten Mountain viewpoint. In these locations, there must be a clearly delineated and enforced separation between automobile and pedestrian movement, with the former restricted to designated roadways and parking areas.

In areas of concentrated pedestrian traffic, appropriate paving should be provided to prevent trampling and erosion. This is especially true where pathways cross sand beach ridges. At these locations foot traffic must be concentrated on special boardwalks, ramps and stairs. Snow fencing should be used to block potential bypasses and existing worn areas. Most users will find walking on paths easier than trampling in deep sand and if properly located, the walks should be well used.

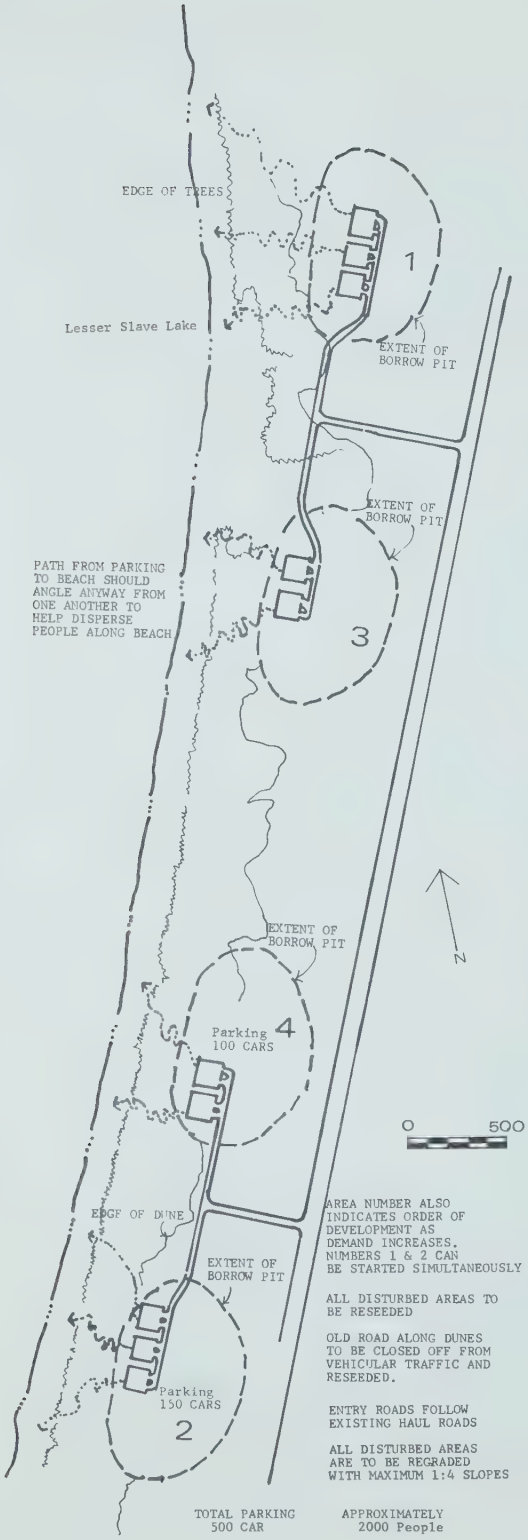
Where land is stable and not apt to be affected by drifting sand, asphalt or gravel walks are appropriate. In areas of potentially heavy sand movement, boardwalks and wooden stairs have the advantage of being easily re-set from year to year. In wet or muskeg areas, log roads can be made using short lengths of log bound or stapled to steel cables. These may also prove successful in sand areas.

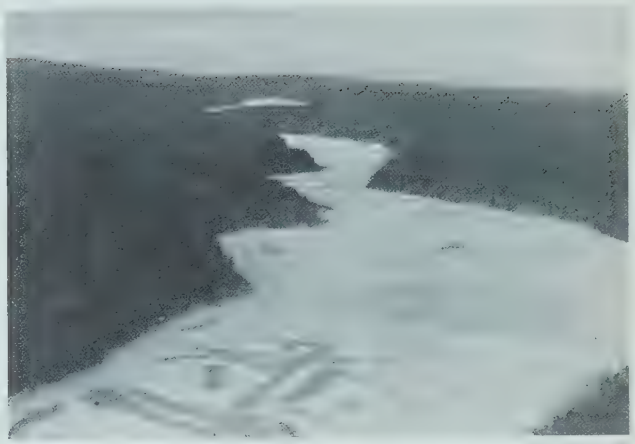
Whenever possible, ramps should be used in place of stairs to facilitate heavy foot traffic as well as the movement of wheelchairs and baby strollers, etc. For example, a zig-zagging ramp may have advantages over a long stairway surmounting a sand storm beach. In addition to easing the effort of older people, such an arrangement would not funnel wind perpendicular to the beach and should therefore be less susceptible to aeolian erosion.

When stairs are required, they should provide frequent landings and not be overly steep. Raiser/Tread ratios developed for indoor use are generally too steep for outdoor use.

Change houses associated with day use beach areas should be located near parking areas so that users can then return to their cars for storage of street clothes, etc.

In addition to beach areas, there exists two potential interior sites suitable for day use, Lily Lake and Marten Lake. Access to Lily Lake could be developed by trail from a parking lot near the Marten Mountain Fire Tower. This trail would be approximately 1 1/2 miles long and would take the visitor through an area of considerable variety and beauty. There would be a picnic area at Lily Lake and possibly a shelter when use justified such a facility. This area would probably not be heavily used, but seems to provide an ideal short family hike.

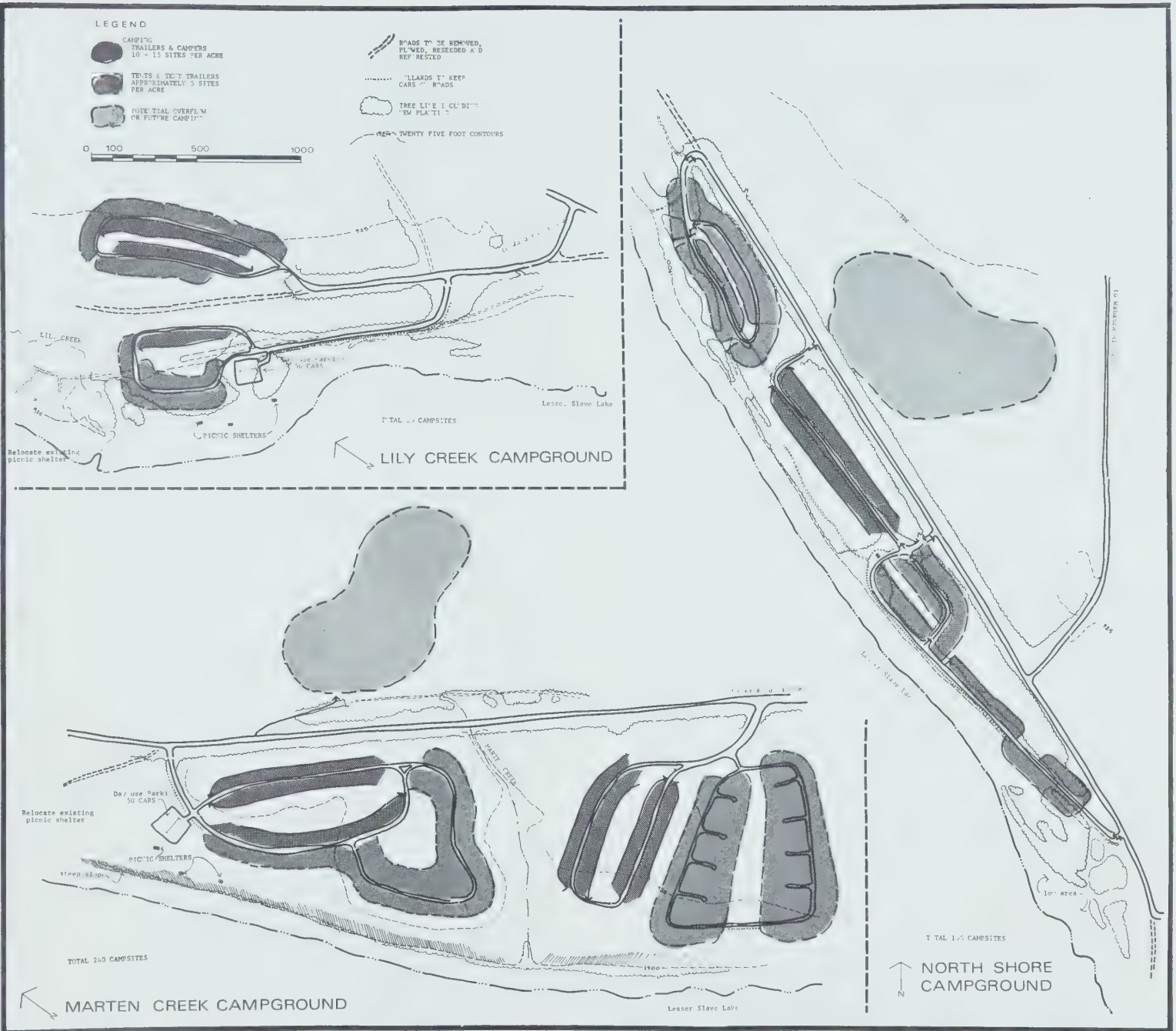




Aerial Winter View of Marten Lakes

The Marten Lakes offer limited fishing potential in terms of catch, but their setting may partially compensate to many anglers. Therefore, a trail should be developed from the Wabasca Highway to the first lake, a disturbance of approximately three miles. Primative tent sites could be developed near one of the lakes and a parking area should be provided at the highway. It would be very easy to overdevelop this area and care must be taken to prevent unnecessary exploitation.

2.) Campgrounds require extensive automobile access and a network of foot paths, both of which are very damaging to a fragile ecosystem. Therefore, in order to avoid deteriorating conditions they should be located on areas of high carrying capacity as previously defined. Such areas tend to be aspen woods on till soils and have the added advantage of usually dense understory screening between campsites.



MASTER PLAN STUDY

EAST LESSER SLAVE LAKE PROVINCIAL PARK

ALBERTA DEPARTMENT OF LANDS AND FORESTS · PROVINCIAL PARKS DIVISION

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CAMPGROUND IMPROVMENT DIAGRAMS

Unfortunately, Aspen woods are usually associated with gravel or mixed sand/ cobble beaches rather than pure sand beaches. However, several areas of this type exist adjacent to good sand beaches near Lily Creek and Marten Creek. Therefore, it is recommended that new campsites be developed in these areas to replace existing facilities that have far overrun carrying capacity. In this way relatively permanent campgrounds could be developed on the lakeshore in which campers could share adjacent sand beaches with day use tourists, as has been shown on the accompanying drawings. Unfortunately, there is not enough sand beach in the study area to allow both day use and camping at densities low enough to avoid damage to the park.

3.) Overflow campgrounds should be developed with minimal facilities in suitable areas within walking distance of beach areas. Another area, the ancient abandoned gravel beach east of the Municipal Park, supplies a scenic location and previous gravel excavation suits it to parking lot development. This area appears appropriate for camper and trailer parking on an overflow basis.

Because of the seasonal nature of park use, it is important that sufficient attention be paid to regulated overflow areas as a desirable alternative to allowing campers access to every well road and clearing.

4.) Interpretive Sites. In the opinion of the Consultants, the two principle uses of the park are:

a. Lake-oriented camping & day use
b. Interpretation of natural and cultural history.

As noted in previous discussions of geography, geology, archaeology and ecology, the study area is exceptionally rich in diversity and quality of interpretive resources, and it is most important that these be well used. Some examples follow:

a. The site of old Fort Waterloo is said to be located at the oxbow lake near the highway at the south entrance to the study area. This site should be studied with the idea of making it a centre for park information and a museum of the Fur Trade Era. It should also contain exhibits illustrating the culture of local precolombian inhabitants and their adaptation to the boreal forest environment.

If properly handled, these exhibits could go far towards re-establishing or re-enforcing historic pride among native people of the region while demonstrating to tourists a most interesting picture of history.

The development of such a museum may well be beyond the scope of the Provincial Parks Branch, yet a collatorative effort on the part of the Branch, the townspeople of Slave Lake and appropriate government and university agencies could well bring about such a development, or at least the first phases of it.

b. The clearings adjacent to the Marten Mountain Fire Tower are ideally suited to development as an overlook with interpretive descriptions of local geology. In addition, prehistoric peoples may have used this prominance and left noteworthy evidence of their occupancy. This area should also serve as parking for a trail to Lily Lake, 1 1/2 miles distant.

c. The lines of ancient abandoned beaches in the South-eastern corner of the study area are quite unique and should be developed as nature study areas.

In the past, the nearby sedge marsh often contained large numbers of geese, ducks and swan. Perhaps if the area were protected from hunting and properly managed as watertown habitat, it could possibly become again heavily populated. In this case, the abandoned beaches would make ideal observation points.

MUNICIPAL PARK

The Municipal or Regional Park located within the Provincial Park is being developed as a town-owned facilties oriented park. As such it should not find competition from the more primitive facilities of the Provincial Park to be severe. It is wise that since the municipal park has no lake frontage it should compensate by providing fully serviced campgrounds at a reasonable cost.

In reviewing the Municipal Park development plan it is noted that rather limited campground facilities are shown at a distance of some 2000 ft. from the beach of Lesser Slave Lake, although one corner of the Municipal Park is within 400 ft. of the lake. It would seem preferable if more serviced campgrounds were located near the lake shore and along the western boundary of the property.

The desirability of the large lagoon development in the Municipal Park is not immediately clear, but if the expense of clearing and construction is justifiable and the project is skillfully carried through, it should provide a noteworthy amenity, albeit rather limited in scope compared to the vastness of Lesser Slave Lake. Perhaps rental cottages could be skillfully sited to benefit from the lagoons attractiveness.

Care must be taken in planning the Municipal Park to provide a reasonably compatible combination of attractions for both local citizens and tourists. For example, although auto racing may be very popular locally, it may generate enough noise, dust and confusion to interfere with the attractiveness and desirability of adjacent campgrounds in the same park and in adjacent Provincial Park campsites. Perhaps there are other sites near Slave Lake townsite that are better suited to auto and snowmobile racing.

WINTER SPORTS AREA

Winter sports potential exists in the form of moderately good slopes along the north and east facing sides of the Muskeg Creek drainage on the south face of Marten Mountain. This area is outside existing park boundaries. These slopes extend for a horizontal length of from 0.7 to 1.1 miles and a vertical distance of 250 to 300 ft. giving an average slope of approximately 6%,this length could be handled by a simple rope tow facility. This slope may be adequate for novice skiers, sleding, etc., although field surveys would be necessary to determine this.

Actual runs could be located with a north-eastern orientation and the heavy pine and spruce growth of the area would protect it from melting and from winter winds. It should also be noted that throughout the season this orientation and tree cover would make any slope clearing invisible from the park.

Access to the area would be gained by expanding the existing road with an additional 3½ miles of new construction.

While the development of such a facility depends upon many external conditions, it is only within our terms of reference to comment upon recreational potential. In comparison to ski areas in the Rockies, this area would not even be considered. It may however serve a local or regional need and as such should be compared to the existing local skill hill south of Slave Lake townsite. No comparitive evaluation could be reached until ground reconnaissance of the Marten Mountain area has been undertaken and development costs estimated.

There have been questions regarding the feasibility of winter sports development on the west or south slopes of Marten Mountain gaining access from the existing fire tower road. There are several factors indicating the low probability of such potential:

1.) The general slopes of the area are not sufficiently steep.
2.) The orientation of the area would expose slopes to melting and winter wind.
3.) The fire access road appears to be excessively steep for winter use.

COTTAGES

The Consultants agree with W.M.Baker (Part A - p.13, 1971) who states: "Class 1 beaches are a scarce resource. Class 2 shorelines are not particularly extensive. These resources cannot be indiscriminately allocated to private use for there is a long term public need for such areas. Much of the future tourist visitation to the area depends upon public camping and general use opportunities in these areas."

This statement applies to all of Lesser Slave Lake, but it should be especially directed towards planning in the provincial park. There are many beautiful miles of cobble beach outside the study area that could meet future demand for shoreline cottages.

In the case of the Marten Creek Subdivision and Johnson's Resort area, two exceptionally scenic areas have been allocated to the exclusive use of a relatively few people. In spite of this lower density of users, damage to the sand dune areas of the Marten Creek Subdivision and the stream side areas of Johnson's resort is likely to be higher under cottage development than under day use beach and creek side campround development.

1.) Cottage construction and installation of services requires extensive leveling and excavation which results in tree cutting and destruction of ground cover.

2.) Development quality controls, even on leased land, rarely have sufficient strength to prevent unnecessary destruction.

3.) Park areas can, if necessary, be periodically closed for regeneration -- cottage areas cannot.

4.) Even on leased land cottage owners often develop very proprietory attitude towards allowing public access along the shoreline with the result the public park values are locally impaired

Other Private Holdings

The Ranch owned by Mr. Eban Ebanau just north of the North Shore Campgrounds presents, in our opinion, a non-conflicting use. The view of the old barn and clearing in the aspen wood is quite pleasing. Furthermore, it might be possible to use this area as a riding stable and centre for trail rides up Marten Mountain.

It would be a cause of concern, however, if this parcel should one day be developed for an inappropriate use. It is, therefore, recommended that some means of legal land use control be developed and negotiated with all private land holders within the existing boundaries of the Provincial Park and areas suggested for expansion.

RESOURCE EXTRACTION & TRANSPORTATION

It is recommended that no further clearing be allowed for petroleum extraction, transportation of for servicing well sites with in park boundaries,and a moratorium be placed on such development in areas of suggested park expansion. This should not be unreasonable for it is our understanding that petroleum extraction in the area has nearly exhausted the local resource.

FOREST INDUSTRY

Timber operations on the side of Marten Mountain have been considered by the industry and the Consultants recommend that no such operations be permitted which would be visible from the Provincial Park or areas of its possible expansion. In addition, no such operations should be allowed if a reasonable possibility exists of clearing operations causing siltation or flooding of creeks and streams within the expanded park area. Destruction of scenic background or biological resources would have a very marked negative effect upon the value of the Provincial Park.

NORTH WEST PIPELINE STUDY GROUP

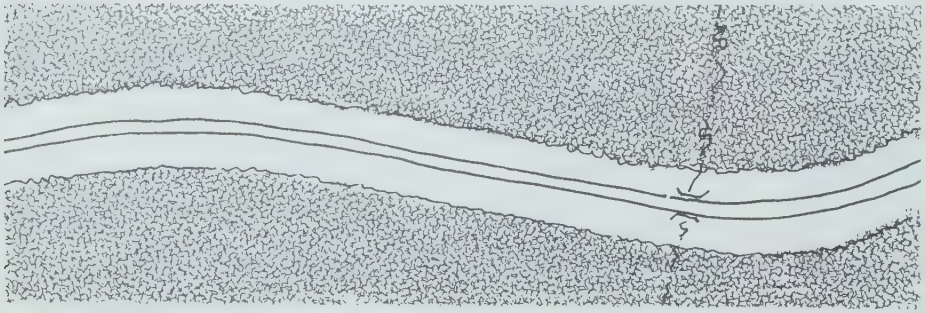
There has been talk that this petroleum consortium recommends an oil pipeline right-of-way from the arctic to Edmonton passing over Marten Mountain. Although there are no doubt technical reasons for this, construction of such a magnitude would be readily visible on the slopes of Marten Mountain and may seriously damage the Lily Lake area. It is strongly recommended, therefore, that alternative alignments be studied by both the Consortium and the Province in order to avoid serious impairment within the park area.

HIGHWAYS

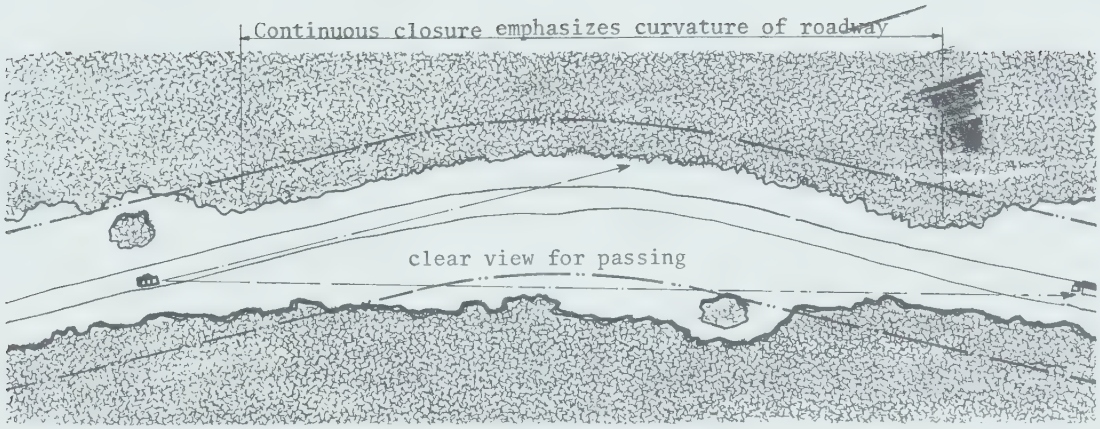
In as much as this section of road is in existing or proposed park land and use of the road constitutes a significant part of the park experience of tourists and visitors, who in turn will constitute a major portion of road traffic, we feel well justified in recommending that this section of road be developed in such a way as to maximize its scenic potential. We note that no apparent attempt was made in this regard to ameliorate the just completed section of road. In order to achieve a high quality scenic highway conforming to reasonable transportation and economic standards the following suggestions are offered:

200' UNIFORM CLEARING ON NEW WABASCA HIGHWAY IN LESSER SLAVE PROVINCIAL PARK

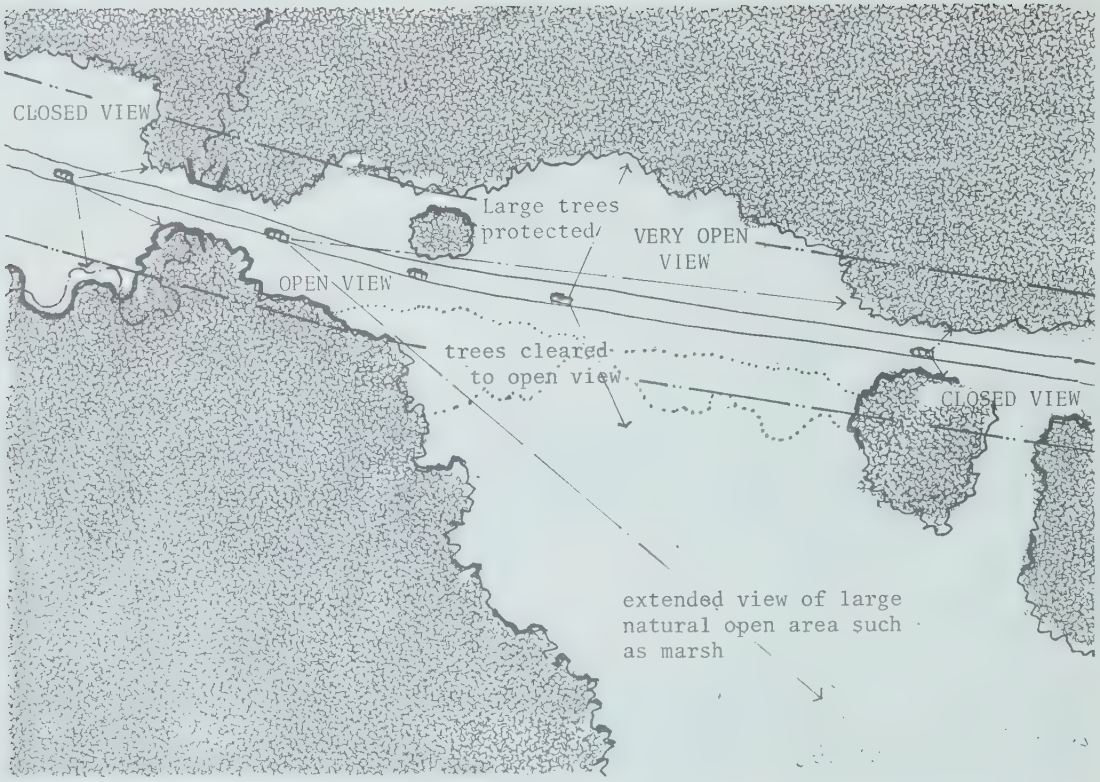
1.) Rights-of-way should be selectively cleared, ie. where factors such as sight distance or distant views take precedence, side clearing would be indicated for the side affected. Otherwise clearing should be limited to minimum necessary for road construction and maintenance. We note that the National & Historic Parks Branch Arterial Rural Road Standards call for 120' of cleared right-of-way. In areas of special nearby visual interest, such as stream crossings or unusally large trees near the road, clearing should be very minimal. In addition, contrasts between tight closure and open areas can be orchestrated to add greatly to the enjoyment of the traveler. The following sketches will serve to illustrate a few examples.



UNIFORM SYMETRICAL CLEARING
- montononous
- inflexible
- little visual interest



VARIABLE ASYMETRICAL CLEARING
- High visual interest
- Adjusts to Local Conditions & Amenities
- Scenic Alignment & Treatement
  Adds to overall park experience



2.) Borrow pits should not be located within areas recommended for park expansion or of existing park use.

3.) All culverts carrying continuously flowing water must be sufficient size to prevent water flow rates from exceeding the ability of fish to ascend them. Also, culvert outfalls must not be located above the water level of the downstream end. This would block upstream fish migration.

4.) The major fish species in the area are quite susceptible to destruction of breeding grounds by siltation, therefore, all reasonable precautions must be taken to ensure minimum siltation of waterways by construction activities and erosion resulting from the work. Strict supervision is in order.

5.) Major wildlife crossings should be identified as soon as possible and sufficient budget withheld for provision of special mirror reflectors to warn wildlife of approaching traffic and for signs to warn motorists of crossing points.

6.) Bridges at Lily Creek and Marten River should offer sufficient underclearance (12' min) to serve as wildlife underpasses.

7.) We agree with the proposal that the highway be routed around the Lily Creek Campground, but recommend that the new alignment be located approximately 1,500 feet east of the existing campground. This would provide sufficient buffer (200 yard Provincial Park standard) between the highway and expanded campground facilities. It is well known that traffic noise is a major detraction from campground enjoyment.

8.) With regard to the section of the road adjacent to the lake shore we strongly agree with Mr. M. J. Dolinsky, Chief Planning Engineer in his letter of August 4, 1971, to Mr. T. Drinkwater, Director, Parks Branch, when he states that"...it should be possible to do all the widening on the side farthest from the lake to avoid reducing the area between the road and the lake shore." We further suggest that all existing trees between the existing road and the lake be protected from construction damage. Under no conditions should the backshore or foreshore of the lake be affected by the road widening.

9.) The alignment of the new road heading inland just south of Marten River Campground should be studied to ensure the drivers traveling south on this section will get a good view of the lake and lake shore ahead of them.

10.) The proposed connection between the new road and the Marten River/Johnson's Resort area should be delayed until justified by future traffic as recommended by the Project Report (Secondary Road 967, Proposed Primary Highway S. of Lily Creek-jct. 754 P.5)

11.) Where this inland section of the road passes the large sedge-willow-alder marsh area we recommend that the roadside be developed so as to allow the motorist extended views into this natural open space.

12.) The mosaic shows the existing road being relocated to create a more acceptable intersection at the termination of the new highway project. While we do not object with this proposal, we strongly object to this relocation being developed with a cleared 200' right-of-way. Furthermore, we recommend that all park access ways (including those consisting of abandoned sections of Road 967) be considered low speed roads with absolute minimum clearing and maximum scenic attractiveness. If, in the future, any of these roadways are to be linked to the proposed North Shore Loop Road they should be widened only at that time.

13.) We agree with the recommendations that the future north shore loop road be located a suitable distance away from the shoreline to provide for recreational use of the lake edge. In addition, areas of muskeg and unstable lakeside scarps must be circumvented. Our recommendations for generalized road location along the north shore will be shown on our proposed Land Use Plan.

14.) Many of the scenic highway developments described above can only be implemented through close field evaluation and supervision. For this reason we strongly suggest that a member of your planning staff be assigned a considerable amount of responsibility for this task and that members of your biological staff also play an evaluative role. It is imperative that these personnel have authority, if necessary, to stop the bulldozers and order minor readjustments to roadside treatment on the spot. They must also be impowered to protect waterways from siltation.

TRAILS

Although the greatest recreation demand will be for lake front recreation and short informative nature trails and exhibits, there exists a good potential for hiking and riding trails.

The trails to Lily Lake and Marten Lakes have already been mentioned. Additional trails should be developed, as demand indicates, along the west slope of Marten Mountain in the area of the belt of springs and from Lily Lake over the highland plateau and down to Marten Lakes trail (10 m) with side trails descending to Marten Creek (6 m) near the junction of the highways to Utiluma and Wabasca. These trails would show the hiker a wide variety of plant and animal communities combined with overlooks and interesting geological formations.

PARK EXPANSION PRIORITIES

The existing park area is very limited in terms of available recreation resource of the area. Also, the development and maintenance of this resource as a cohesive and soundly managed unit depends upon capital outlay and technical resources beyond the economic reach of local private development. For these reasons, as well as the concept that certain resources should remain in the public trust, it is reasonable to suggest expansion of Lesser Slave Provincial Park.

A. Shoreline expansion seems to be the most obvious first priority, since the shoreline is the principle visitor attraction. It is, therefore,recommended that all shoreline property within the study area be obtained beginning at the northern most cottage site on the north side of the mouth of Lesser Slave River and extending up the east shore and westward along the north shore approximately to the limit of the study area.

The southern shoreline area has first priority and should extend eastward to include the abandoned beach ridges and sedge marsh to a north-south line at Muskeg Lake. The expansion should also extend southward to include Lesser Slave River east of existing townsite development with a 400 ft. buffer beyond the south river bank where possible. This would leave the river mouth and first meanders open for private development eastward to the confluence of Sawridge Creek.

As a second priority, the north shoreline acquisition should extend northward to the limit of township 75, giving a shoreline area between land 1½ miles in width and including the side-slopes of the lake. The area beyond is essentially flat and not visible from the lake.

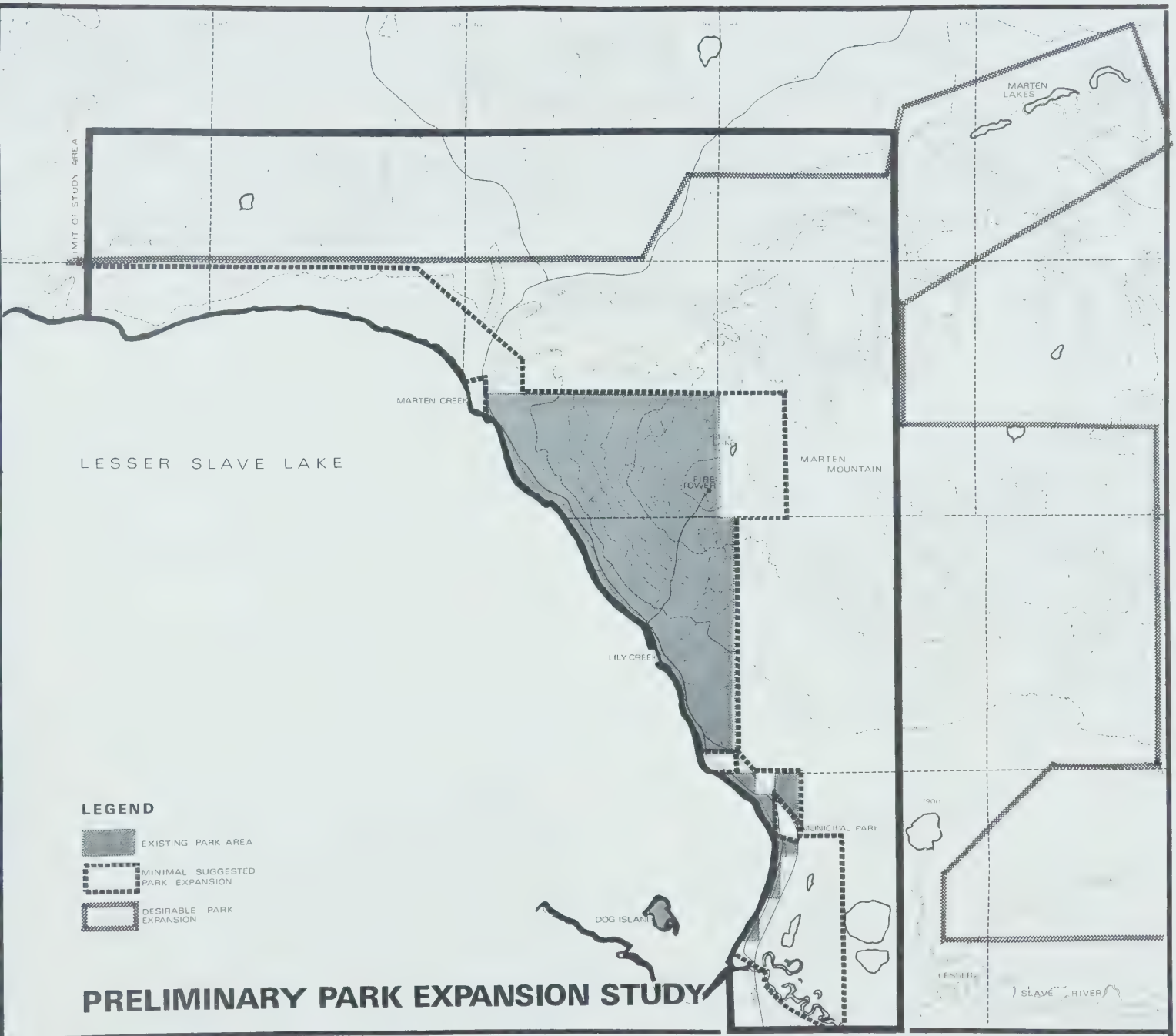
B. Interior expansion should first include the Lily Lake area extending 1½ miles east of Range 6 and 3 miles north of township 4.

Additional expansion should include Marten Lakes and Marten Creek encompassing both sides of the valley up to and including opposing ridgelines.

C. Long term expansion could include the south facing slope of Marten Mountain including all of the Muskeg Creek drainage area. With this area protected the principle backdrop for the park and the east end of the lake would be safe from scaring and inappropriate development. This area includes the possible winter sports areas and an administrative decision must be made regarding the desirability of including this site in a provincial park.

Muskeg Lake and nearby sloughs and muskeg of the ancient lakebed may deserve inclusion as a wildlife sanctuary, owing to the population of woodland caribou that presently populate this area extending into the Mitsue gas fields.

The future may also see the inclusion of the Lesser Slave River to its junction with the Athabasca River included into some type of public recreation reserve. Perhaps this could take the form of a Wild River designation for the Athabasca/ Slave River System.



PRELIMINARY PARK EXPANSION STUDY

MASTER PLAN STUDY

LESSER SLAVE LAKE PROVINCIAL PARK

ALBERTA DEPARTMENT OF LANDS AND FORESTS · PROVINCIAL PARKS DIVISION
LOMBARD NORTH PLANNING LTD. WINNIPEG·CALGARY·VANCOUVER APRIL 1972

NORTH

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GENERAL RECLAMATION AND MANAGEMENT RECOMMENDATIONS

1. Sand dune area - disturbed areas and cut banks should be regraded, where possible to 3:1 slopes. These slopes should be shaped to approximate the natural appearance of adjacent slopes. If topsoil is available, the slopes should be top dressed with 4-6 inches of loam.

After topdressing and final grading, areas should be hydroseeded with a mixture of native grasses and root cuttings of wild rose, low bush cranberry, vetch and other ground cover perennials. This mix should be the subject of considerable study and experimentation by parks naturalists.

Although native grass seed is much more difficult to obtain then standard erosion control varieties, every effort should be made to prevent widespread desemination of exotic plant materials in provincial parks.

In areas of extreme wind erosion, snow fencing should be installed and replaced as necessary.

2. Road closures - many existing roads are to be closed as a result of new highway construction. It is recommended that such roads be ripped to the depth of uncompacted subsoil and regraded to conform to adjacent natural contours. After regrading, all disturbed areas should be hydroseeded with native plant mixture similar in description to that given above, but formulated to be compatible with surrounding forest type.

3. Campground Restoration - Both Marten Creek and Lily Creek Campgrounds should be closed for restoration. The enclosed sketches outlining new campground development describe means by which these areas may be protected while providing alternative visitor facilities. However, because new facilities will in all likelihood not be ready for use before the peak of the tourist season, the following strategy is suggested.

1.) Close Marten Creek Campground throughout the season.
2.) Close Lily Creek Campground during early and late months of the season, but open it during peak periods.
3.) Develop the new Marten Creek Campground as a first priority.
4.) Post well constructed signs explaining the reasons for closure.
5.) Install log bollards and heavy chain gates to block all possible points of auto access. Snow fencing or wire fencing would be inadequate. Campers on foot do less damage than vehicles.
6.) Enlist the help of the Slave Lake Chamber of Commerce in advising the public of the necessity of closure and the advantages of the new program underway.

ADDITIONAL STUDIES

It is the purpose of this report to give a balanced picture of the study area, and to present general conclusions. It was impossible to deal in full depth with certain aspects that merit further investigation. It is therefore, recommended that the following further studies be undertaken:

1. Archaeological Survey: The study area is very likely to contain exceptionally valuable archaeological sites. A thorough survey with selective excavation should not be costly and could result in major benefits for the park's interpretive program, as well as contributing substantially to Alberta's historic heritage.

2. The body of this report identifies areas of potential potible water supply. There remains the job of testing these potential sources and evaluating the results. While such detailed survey and testing is well beyond the scope of this report, it remains essential to the development of water supplies to recreation sites in the park.

3. There has been relatively little work done on the problems of re-stabilizing sand dunes after construction in this climate. Therefore, field studies and experiments should be undertaken emphasizing the use of indigenous materials and plant species. Methods developed for this area may prove useful in other parks and forests as well.

GEOLOGIC AGE		LAND UNIT	LITHOLOGY	TOPOGRAPHY	SLOPE	DRAINAGE	GROUNDWATER	FOREST COVER	UNDERCOVER	WILDLIFE	ENGINEERING IMPLICATION	RECREATIONAL IMPLICATIONS	PARK FACILITIES SUITABILITY	GENERAL REMARKS
RECENT	HUMAN HABITATION	FILL	Roads, local material, buried pipeline	level		well drained, variable infiltration	NIL	NIL	NIL	NIL?	underground installation	should be kept to minimum	access roads, parking lots, wildlife pasture	
		CUT	Borrow pits	depressional	variable	poorly drained, ponds when developed in impermeable material	Ponds may represent ground-water table	NIL	NIL	NIL	depends on original deposit, steep slopes minor erosion	major reclamation required	selected reclaimed sites may offer excellent suitability	
		OTHER	Bridges, culverts, buildings, concrete foundation, miscellaneous iron	NIL	NIL	see original surficial deposit	NIL	NIL	NIL	NIL	removal would present problem	inventory objects	normal suitability	
		COLLUVIUM	Loose mixture sand silt clay, gravel, bedrock	scarps and all steep slopes	10 - 25%	slope wash, well drained but high water bearing capacity	saturated during rain storms, location of springs				landslide potential, soil creep, loose plastic	should not be disturbed	restricted except for foot paths	
		MUSKEG	sedges and peat moss	flat to slightly depressional	0%	very poorly drained, surface ponds, low infiltration, subject to flood	very high ground content, water quality very poor, low permeability	open, Larch Black spruce	Labrador Tea & Sphagnum Moss	Caribou Moose small Mammels some waterfowl & wading birds	very low bearing capacity, low unit weight	vulnerable to development of any kind	restricted	
		SAND BEACH	Sand, fine to medium grained, inclined bedding, some gravel; mainly quartz-feldspar composition	gently inclined surface	1%	well drained but subject to wave wash and periodic flood	excellent aquifer water quality should be good	Nil	NIL	Wading and Shore Birds - Mollusks	subject to aeolian erosion and near-shore current processes, drift wood offers protection against erosion	local water supply from sand points check near shore processes to insure permanency of beach, no structures or buildings, do not remove driftwood	light foot traffic only, highest user potential	one of the most resistant parts of beach but contains only patches of sand Sanitation and sewage must not be allowed to pollute
		GRAVEL BEACH	sand and pebble to cobble gravel (50-50)	gently inclined surface	1%	well drained, but subject to wave wash and periodic flood	excellent aquifer water quality should be good		NIL	Wading and Shore Birds - Mollusks	as above but water well drilling less feasible	as above, high trafficability	light foot traffic	one of the most resistant parts of beach but contains only patches of sand Sanitation and sewage must not be allowed to pollute.
		COBBLE BEACH	Cobble gravel	gently inclined surface, rugged microrelief	1%	well drained, subject to wave wash and periodic flood	good aquifer, but difficult to drill	NIL	NIL		erosional lag deposits and as above	no development	restricted-available to hikers, very resistant to use	
		ORGANIC BEACH	any above three lithologic types but with rich shrub and shoreline vegetation growth	very gently inclined	1 - 4%	poor to fair drainage	may be the best aquifer (shallow) along shore	immature Poplars, Spruce Willow and Pine	Dogwood, Rose, Juniper, Alder Willow	occasional visit by Deer, Moose - Bare, Lynx, small mammals and birds	rapid sedimentation drilling equipment may damage surface		water well location, light foot traffic	
		FLOOD PLAIN	silt, clay with sand, rare pebble gravel, large charcoal rich layers	flat, even	1%	moderately well drained	surface granular layers may provide excellent aquifer; high groundwater table	Poplar dominated Mixedwood	Dogwood, Rose, Saskatoon Buffalo Berry etc.	Moose, White tail Deer, Mule Deer, Hare, Lynx, small mammals	frost action, moderate bearing capacity minor threat of periodic long term flood	may be major source of groundwater	sheltered flat area provides excellent development sites	
		POINT BAR	pebble to cobble gravel, layered, silt, clay and sand intervals	ridged, local relief of 2 to 5 feet, alternate flat	Variable	very well drained	major source of near surface groundwater-table of groundwater very high	Willow	Dogwood	Waterfowl shelter area	source of gravel, excellent foundation	excavations may be difficult to clain- low nutrient soil	campsites, parking lots, trailer lots etc. nature trail	
		ACTIVE DUNE	Fine grained, quartz, sand	local relief 10 to 15 feet, parabolic to blowout	Variable	extremely well drained, high infiltration	low groundwater table, good quality if found	Nil	NIL	NIL	source of sand easy to excavate; high susceptibility to erosion	extremely sensitive to all critical localities, may have to be stabilized - detailed planning required	no development- highly sensitive specified light use at selected localities	interpretative potential, sanitation & sewage installation must not be allowed to pollute
		STABLE DUNE	fine grained quartz, sand	local relief 5 to 10 feet, low rounded outline	Variable	well drained, high infiltration rate	low groundwater table, good quality if found	Jack Pine	low bush Cranberry Bearberry Juniper Grasses	insects	source of sand; good for foundation for building; susceptible to wind erosion if disturbed	sensitive to all but light traffic; no excavations, controlled foot traffic installations	potential water supply, near-surface source, restricted use, trails, etc.	interpretative, potential, sanitation & sewage installation must not be allowed to pollute
		RAISED SAND BEACH	fine to coarse grained sand, some banded pebble gravel, stratified	linear gently curved ridges or platforms 10 to 15', low relief alternative with muskeg depression in places	Variable	ridges very well drained, depressions very poorly drained, surface ponds	near surface aquifer - extensive storage capacity below groundwater table	Jack Pine Willow low Aspen Poplar	low bush Cranberry Bearberry Juniper Grasses	insects	excellent foundation but susceptible to erosion, source of sand and gravel	sensitive to vehicle traffic, reclamation of existing sand pits	extensive potential groundwater source interpretation, ideal building site	
		RAISED GRAVEL BEACH	pebble to cobble gravel crossbeds, gently inclined stratification	same as for raised, sand beach but ridges slightly sharper form and line	Variable	ridge very well drained - depressions poorly drained	near surface aquifer extensive storage capacity below groundwater table	Jack Pine Willow Poplars White spruce	low bush Cranberry Bearberry Juniper Grasses	most animal types	excellent foundation, source of aggregate	reclamation of existing sand pits and selective future extraction	groundwater source, building site, high use capability in level localities	
		LACUSTRINE PLAIN	silty clay to clay, medium grey, thin sand lenses, bonded	flat	0 - 1%	very poorly drained extremely low percolation	impermeable, rare sand lenses, high groundwater table	Larch Black spruce Willow	Marsh grass	Moose & Caribou near margins	compressible clay, low bearing capacity, susceptible to frost action; landslides on steep slopes; fill material	parking lot potential if site well drained compacted and resurfaced	parking lot, light construction	
PLEISTOCENE	LATE	GLACIOLACUSTRINE PLAIN	silty clay to clay, medium grey, thin sand lenses, bonded	flat	0 - 1%	very poorly drained, extremely low percolation	impermeable, rare sand lenses; high groundwater table	Larch Black spruce Willow	Marsh grass	Moose & Caribou near margins	compressible clay, low bearing capacity, susceptible to frost action, landslides on steep slopes; fill material	parking lot potential if site well drained compacted and resurfaced	parking lot, light construction	
		GLACIOLACUSTRINE AND TILL	thin layer of silty clay - 1 to 3 feet thick, overlying till	gently rolling or low hills, local relief, 5-10 feet	Variable	moderately well drained, poor percolation, minor local wet depressions	very little free water except in unpredictable pockets of granular materials	Range from Poplar dominated and Hybrid Mixedwood to Willow & depending on surficial drainage	Dogwood Rose Saskatoon Buffalo Berry etc.	Moose, Caribou near margins	excellent founda.ion conditions below clay layer, some susceptibility to frost action	drainage must be well planned, no source of potable water	high usage capability	
		TILL	silty, sandy clay, dense, plastic, contains moderate number of pebble boulders	hummocky to gently rolling; low relief up to 30 feet	Variable	poor to moderately well drained; ponds and wet depression places	high groundwater table but very low permeability	same as above	Dogwood Rose Saskatoon Buffalo berry etc.	Moose, Caribou near margins	excellent foundation conditions, fill material, susceptible to landslide on poorly drained slopes	drainage must be well planned, very limited source of potable water	high useage capability	
	EARLY	SAND, SAND & GRAVEL	pebble to cobble gravel, partly cemented; well rounded quartzite components	edge of highest scarp on Marten Mountain	steep exposed road cut near fire lookout	very well drained	local groundwater pockets, springs at lowest contact; low groundwater table	NIL	NIL	NIL	source of aggregate excellent foundation, stable, difficult to excavate	reforestation difficult if upper soil removed	interpretative value	
UPPER CRETACEOUS		WAPITI FORMATION	light grey to dark grey shale, variicoloured volcanic ash layers, lignite seams, fractured in part	steep slopes, underlies major scarps		impermeable but some percolation in fractures, very little infiltration	low potential source, poor quality (?)	Nil	Nil	Nil	subject to large scale landslides, highly plastic	erosion hazards	very restricted development; interpretative value	
		BEARPAW FORMATION	medium grey shale	low elevations, rare outcrop	Variable	swelling characteristics, impermeable except when fractured	low potential source, poor quality	NIL	NIL	NIL	highly plastic, swelling characteristics, extremely unstable	erosion hazards	highly restricted, interpretative value	

APPENDIX I - B

Table HYDROLOGIC DATA* - Lesser Slave River

DISCHARGE

YEAR	Maximum Daily CFS	Minimum Daily CFS	Mean Daily CFS	Yearly Total acre-feet
1970	2570 July 1&2	431 Jan. 6	1140	822,000
1969	1600 Apr. 30	441 Feb. 11, 12	791	573,000
1968	2260 June 13	280 Nov. 19	921	668,000
1967	incomplete	records		
1966	3520 Oct. 2	1520 Jan. 6, 7	2340	855,840
1965	4410 June 29	no record	2680	978,590
1964	3360 Sept. 6	poor record	poor record	
1963	incomplete	records		

* Summary of records supplied through courtesy of Water Survey of Canada.

APPENDIX I - C

HISTORIC SITES SURVEY OF LESSER SLAVE LAKE, K. ARNOLD, 1971

East Lesser Slave Lake House

The existence of a Canadian post on the south eastern shore of Lesser Slave Lake is fairly well documented, however, the dates of its operation are not. It was operating during the winter of 1802-3 when Thompson visited this post which he placed about 1/2 or 3/4 mile from the head of Lesser Slave River. It was abandoned by 1816 as Lewis of the H.B. Co. referred to it as the "Old Fort" and again in 1819 as "the NW old house".

Survey Results

The site of the post has been destroyed by the establishment of the Slave Lake airport which was built by the Forestry Department. During construction historic material was collected by Mr. Kirkpatrick who is now Fire Control Officer in the Cypress Hills. Mr. Faust, the airport manager, reported that most of the material was found near the end of the present runway. Construction of a secondary runway will begin either late this year or next spring. If any material is found during the work the P.M.A.A. will be contacted.

Dog Island

Lying about 1½ miles off the south east shore of Lesser Slave Lake, Dog Island is reported to have been the site of a N.W. Co fishery during the early 19th Century.

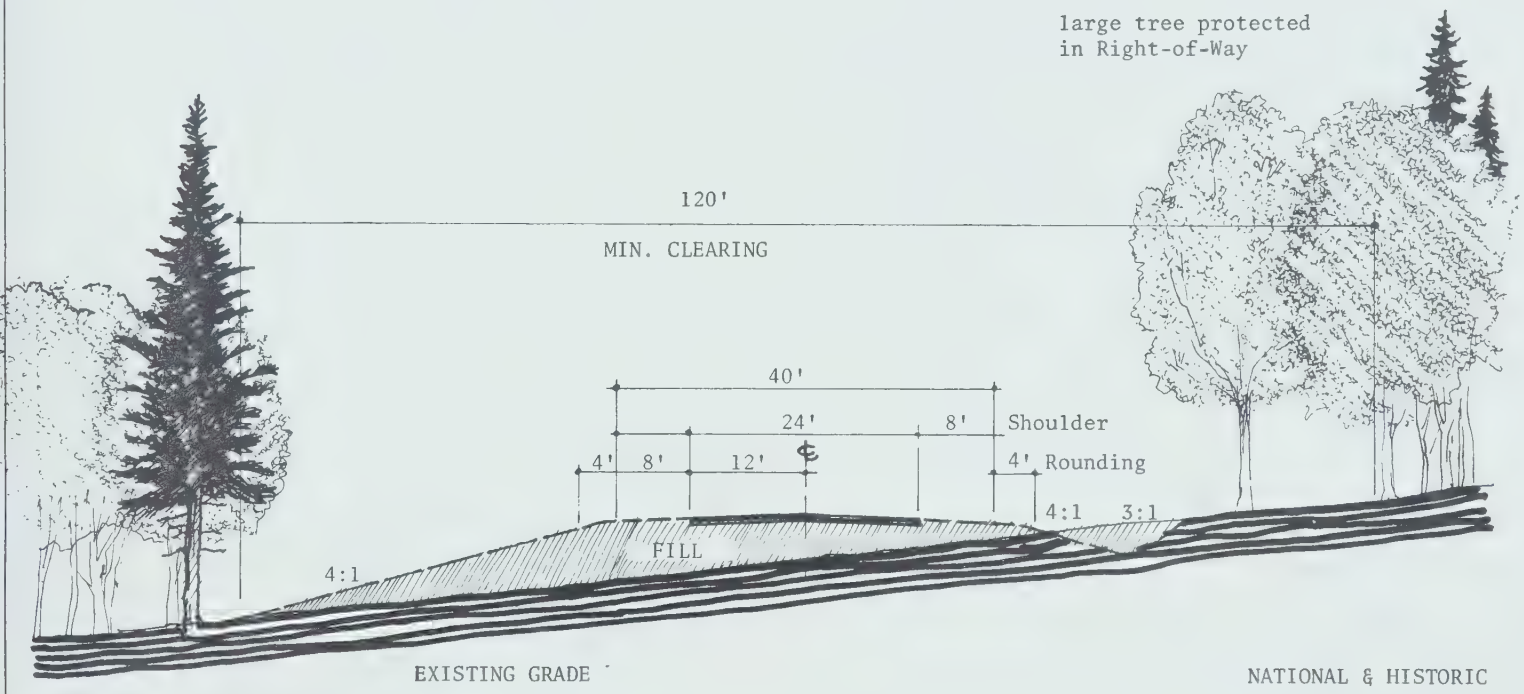
Survey Results:

The only suitable location on the island for a fishery of any size would be on the south east side. Here there is only flat terrain on the island which is high enough above the present water level to avoid flooding in times of high water. The south east corner also has natural protection from the prevailing western and northern winds as well as a sheltered cover with the only sandy beach on the island. However, there were no surface indications of the early fishery. The only sign of occupation were a few rotting fish drying racks and miscellaneous litter of a more recent period.

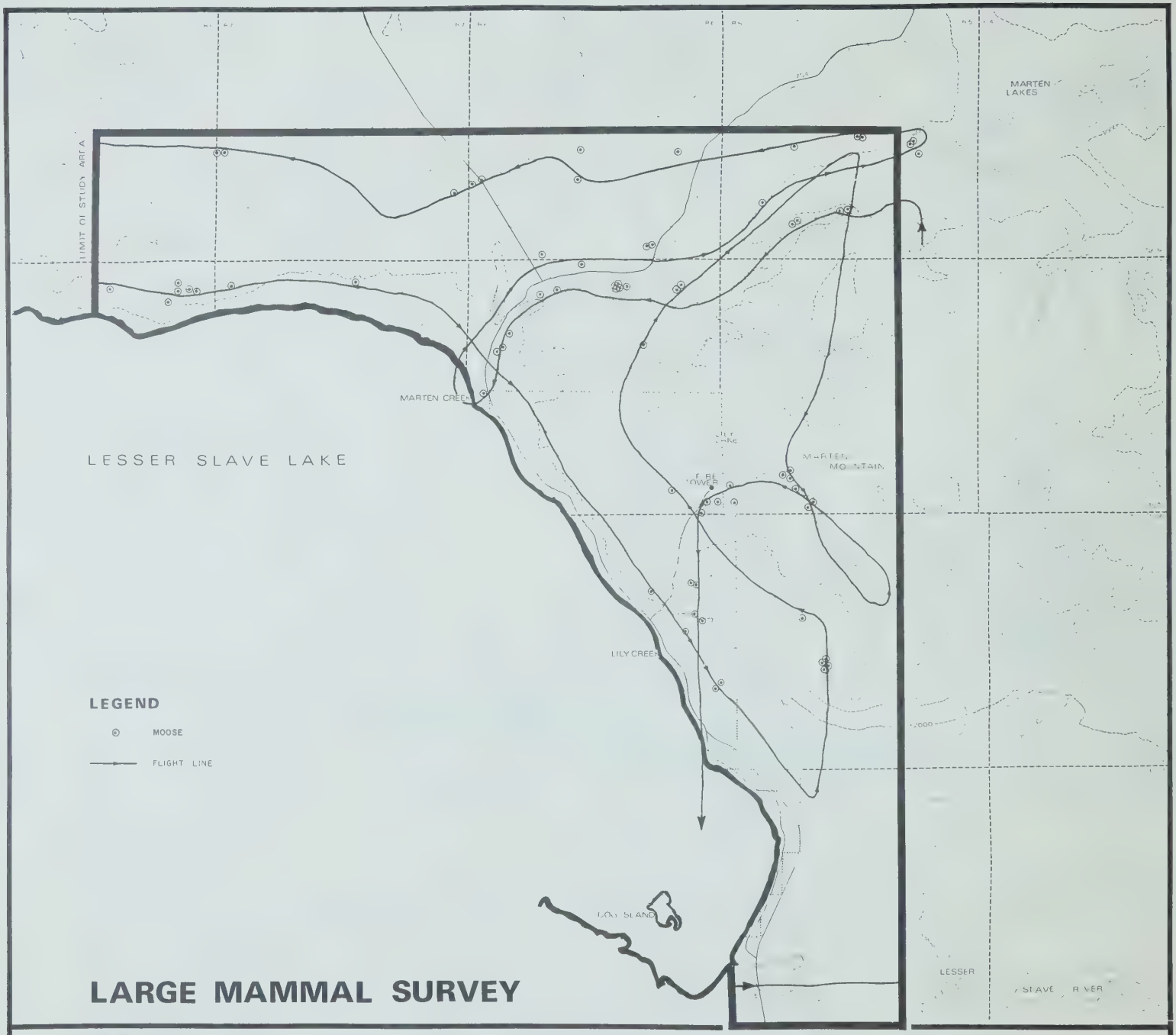
Fort Waterloo

This fort was established by Francois Decoigne for the H.B.Co. in the fall of 1816 and seized by the N.W. Co. in December of that same year. The H.B. Co. re-established the post in the summer of 1818 and occupied it until amalgamation in 1921 when it was abandoned in favour of the N.W.Co. post.

DESIGN SPEED	60 M.P.H.
MAXIMUM CURVATURE	5°
MAXIMUM GRADIENT	5%
CLEARED R/W WIDTH -	MIN. REQUIRED
R.A.U.	60



NATIONAL & HISTORIC
PARKS
ROAD CLASSIFICATION
ARTERIAL RURAL ROAD



LARGE MAMMAL SURVEY

MASTER PLAN STUDY

LESSER SLAVE LAKE PROVINCIAL PARK

ALBERTA DEPARTMENT OF LANDS AND FORESTS · PROVINCIAL PARKS DIVISION
LOMBARD NORTH PLANNING LTD. WINNIPEG·CALGARY·VANCOUVER APRIL 1972

NORTH

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